SAGUARO LAND BULLETIN

DESERT BOTANICAL GARDEN of ARIZONA

JANUARY, 1958

An arrangement with dried desert material. Mrs. Hermann's entry of 1955.

REG MANNING

SAGUAROLAND BULLETIN

Published and owned by the Arizona Cactus and Native Flora Society, sponsors of the Desert Botanical Garden of Arizona, P.O. Box 547, Tempe. Saguaroland Bulletin attempts to promote the Garden and to provide information on the desert plants and their culture. Subscription $3.00 per year, the subscription including active membership in the Society and the Desert Botanical Garden. Issued 10 times a year.

W. HUBERT EARLE, Editor

Volume 12 JANUARY, 1958 No. 1

Arizona Cactus and Native Flora Society

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Desert Botanical Garden of Arizona

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GARDEN OPEN DAILY 9 A. M. TO 5 P. M. INCLUDING HOLIDAYS

DECEMBER IN THE GARDEN

The early part of the month was rather quiet but activities began to hum later on with the result that our attendance, sales, memberships and donations were up 50% over same period of last year. Our sincere thanks to all of our members who have renewed their memberships the past year and to those who repeatedly attend the Garden and bring their guests.

Eleven College and High School Botany classes used our facilities this past month. During 1958 we will be able to give to each Botany class a 15-25 minute lecture with Kodachrome slides relative to the subject in which the class is interested. Botany and Science teachers are urged to ask for reservations as soon as possible for their class field trips to the Garden this Spring.

Fog rarely appears on our desert but the early part of the month brought us one of those desert phenonemas as shown in the following photos taken in the Garden. We recall that the last fog covered us most of the day in late December of 1945.

Fog covering cactus at 10 A. M.

Normal view on a clear day.

ELEVENTH ANNUAL CACTUS SHOW

Preparations are being made for our 11th Annual Cactus Show to be held at the Garden, February 23rd to March 2nd.

The new Schedule of Classifications, which can be 'lifted' out of the center of this Bulletin, is much easier to follow due to the good work of the committee headed by John B. Hales and aided by former exhibitors Mrs. Harold Covert and Mrs. W. A. Holt.

Exhibitors are urged to begin selecting and grooming their plants for exhibition. Competition will be keen and all indications point to another successful Show.

TAXONOMY OBSERVATIONS

CHAS. MIEG, Scottsdale, Arizona

While on a visit to Switzerland last summer, I had the occasion to meet a number of cactophiles, people with whom I have had correspondence for years but had never met.

The quantity of cactus which is cultivated in Europe is enormous and the most amazing fact about this was that these plants were living. The conditions under which they have to be kept and the local climate is such that sun is seldom available and the almost always high humidity are not favorable to their best development.

The rate of growth and the spines show this very definitely. But the European fancier makes up with perseverance where we would never have the patience to keep at such a slow process.

In the succulent collection of the city of Zurich was a small Agave americana, the plant had three leaves but had only two when it was transplanted as an offset eight years ago.

Naturally conversation always turned to taxonomy and the various new genera and species which have cropped up. It was most gratifying to learn that most of our friends heartily disapprove and are fed up with the constant changes that are being produced, mainly by Backeberg. There is a strong tendency to discard this nonsense and return to the system of classification along botanical principles. More and more the ideas of W. T. Marshall are being accepted as the absurdity of the "twenty years of cactus research" becomes apparent.

I did not meet with Prof. Buxbaum again but it is my understanding, after conversations with Mr. Krainz, that while Buxbaum, at this time, is also "taking the different genera apart" this is for the purpose of re-assembling them again when it is determined where the plants eventually should belong.

In general, there was a feeling that there should be much greater co-operation between the Americas and Europe, a feeling which on our last trip to Mexico in November was also expressed by our friends there. We have discussed the possibilities of exchanging ideas and personnel with the University of Mexico and I believe that concrete results will come from our discussions.

There are other moves contemplated which can not be presented at this time, but these moves would greatly enhance the Garden's standing as an institution of scientific stature. Projects which were shelved during Mr. Marshall's illness are being revived and I believe that our Garden will play an important role in further research pertaining to desert vegetation.

Educational exhibit 1956.

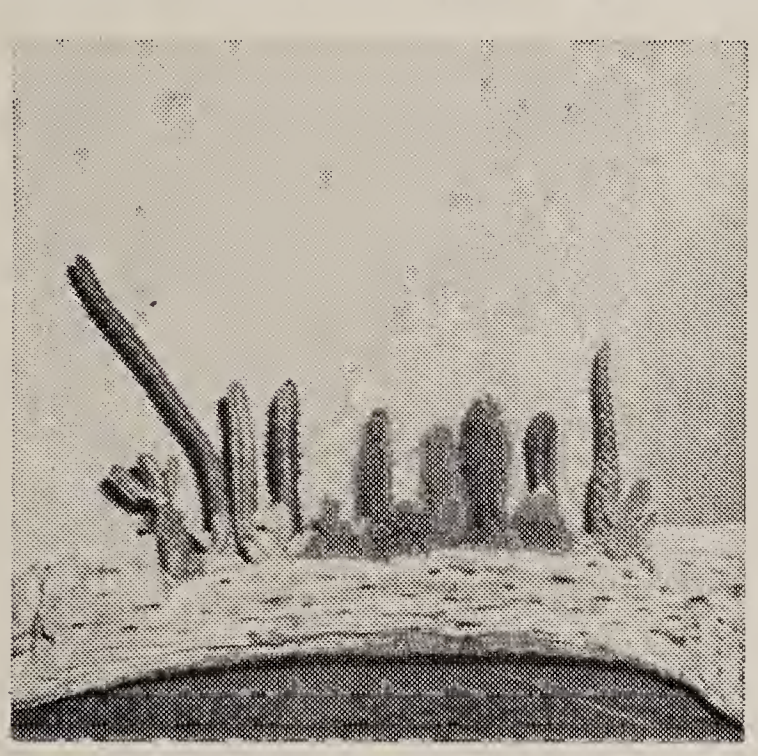
Eleventh Annual

CACTUS SHOW

FEBRUARY 23RD TO MARCH 2ND, 1958

Administration Building

Desert Botanical Garden



Cactus in Cholla Log

Entries can be placed in space assigned after 1 P. M. Saturday, February 22nd or before 10 A. M. Sunday, February 23rd. Exhibits can be removed Sunday, March 2, after 5 P. M. or on Monday, March 3rd. For additional information telephone BR 5-5592.

Exhibits Open to the Public

12 Noon Sunday, February 23rd, 1958

Daily to March 2nd, 9 A.M. to 5 P.M.

ENTRIES AND ADMISSION FREE

CLASSIFICATIONS COMMITTEE

John B. Hales, Mrs. Harold Covert, Mrs. W. A Holt

SCHEDULE OF CLASSIFICATIONS

SECTION "1" **CACTI**

A. **POTTED SPECIMEN PLANTS**

1. MAMMILLARIA
2. CORYPANTHA
3. OPUNTIA
4. THELOCACTUS
5. ECHINOMASTUS
6. ECHINOFOSSULOCACTUS (Stenocactus)
7. LOBIVIA
8. ECHINOPSIS
9. ASTROPHYTUM
10. CEREUS
11. ARIOCARPUS
12. ECHINOCEREUS
13. GYMNOCALYCIUM
14. BARRELS - Ferocactus or Echinocactus
15. EPIPHYLLUM
16. ANY OTHER SPECIES

B. **CRESTED SPECIMENS**

1. Crested Cactus - own root
4. Crested Cactus - grafted

SECTION "2" **SUCCULENTS:**

A. **POTTED SPECIMEN PLANTS**

1. EUPHORBIA
2. DUDLEYA
3. KALANCHOE
4. ALOE
5. SEDUM
6. ECHEVERIA
7. HAWORTHIA

8. AGAVE
9. YUCCA
10. STAPELIA
11. CRASSULA
12. LITHOPS
13. MESEMBRYANTHEMUM
14. PLEIOSPILOS
15. ANY OTHER SPECIES

SECTION "3" **ARRANGEMENTS** (Accessories Permitted)

A. **DISH GARDENS:** (Any Size Garden)
1. Cacti
2. Succulents
3. Cacti & Succulents

B. **CENTERPIECES:** (Accessories Permitted)
1. Cacti
2. Succulents
3. Cacti & Succulents
4. Dried Desert Material
5. Mexican or Indian Influence

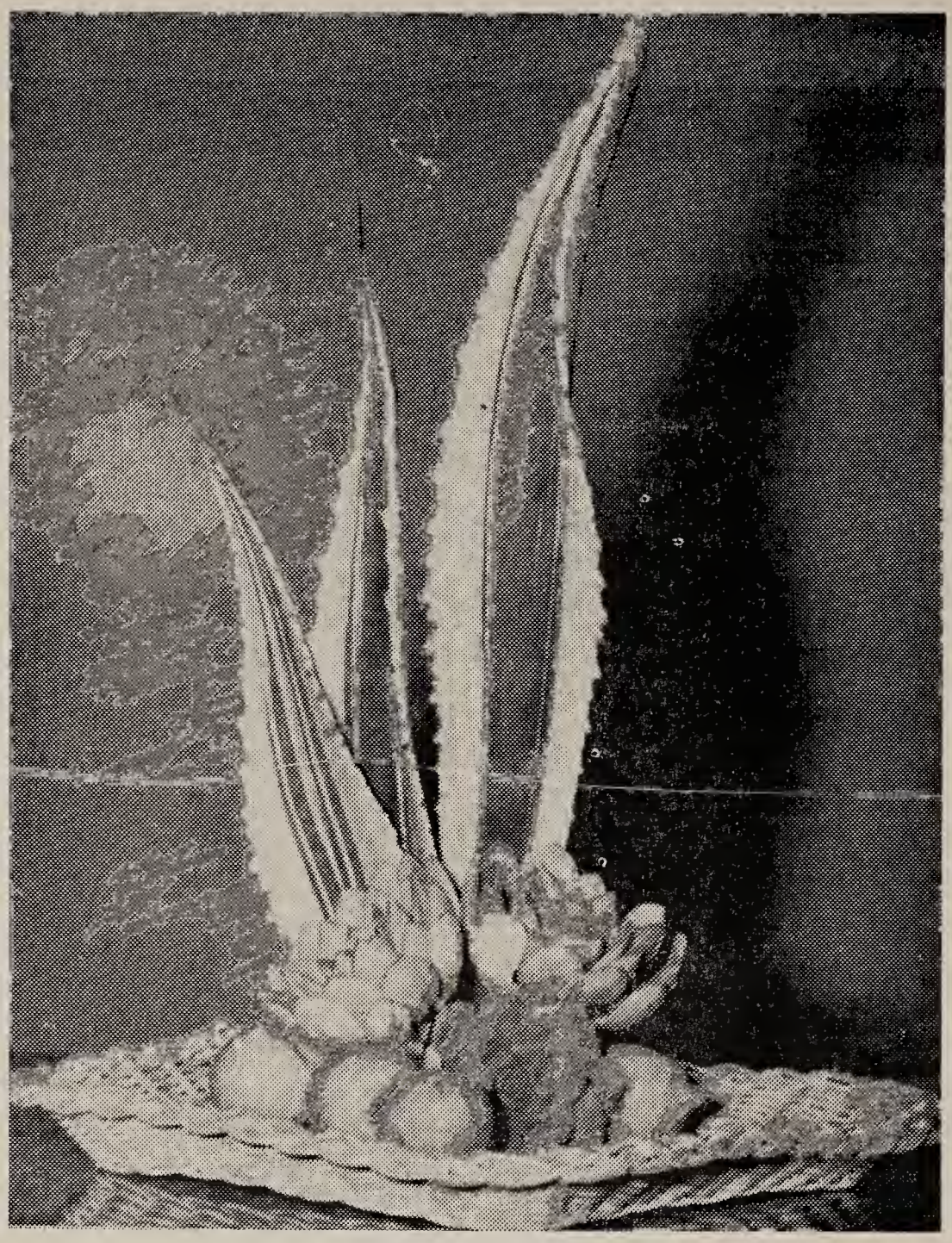
C. **ARRANGEMENTS on/or AGAINST THE WALL —** (Accessories Permitted)
1. Cacti
2. Succulents
3. Cacti & Succulents
4. Dried Desert Material
5. Mexican or Indian Influence

D. **CORSAGES:**
1. Succulents
2. Dried Desert Materials

E. **BUTTON GARDENS**

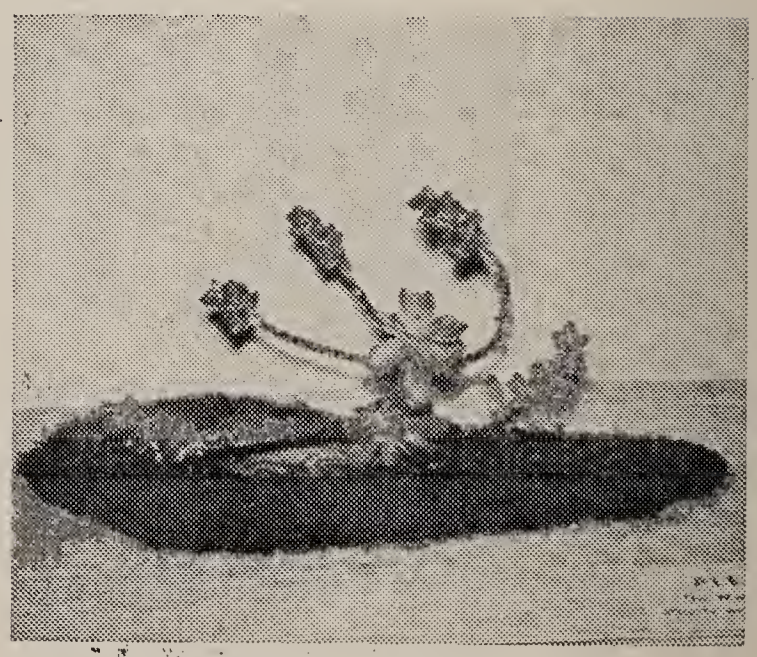
F. **MINIATURE ARRANGEMENTS**

G. **STRAWBERRY JAR**



An outstanding exhibit of the 1957 Show
by Mrs. Hermann.
Photo by John H. Eversole.

Indian influence arrangement.



Centerpiece arrangement.

PAPAGO PARK YIELDS PLANT NEW TO ARIZONA

E. R. (Jim) Blakely - Supt. Santa Barbara Botanical Gardens

The known flora of Arizona comprises 132 families and over 3,423 species of flowering plants, ferns and fern allies. Most of these plants were first reported by the early collectors in the state when its flora was almost unknown. Over the years due to the increased ease of travel very few areas remain that have not already yielded their secrets to the collector. Nevertheless, it is possible to find a previously unreported species in a remote location such as the occurrence of Pediocactus in Houserock Valley. Many of the newly reported plants fall into the large category of "weeds" because they invade the range, farm land, or even lawns in cities, and compete with the desirable plants already growing there.

While I was collecting specimens in Papago Park for the Desert Botanical Garden's herbarium, I found a small plant that did not appear to be special, and in fact it was so small and drab that most people would not have given it a second glance. This plant received the number B-1981 and into the plant press it went. Later it was possible to key the plant in "Arizona Flora" to the Compositae or Sunflower Family and the genus Cotula, but the species listed as occurring in Arizona did not fit the plant in question. By checking the genus Cotula in Jepson's "Manual of the Flowering Plants of California" it was found to be **Cotula australis.** This determination and the fact that it had never been reported before from Arizona were confirmed by the co-author of "Arizona Flora," Dr. Kearney, shortly before his death.

By its name one can deduce that the plant was originally a native of Australia. It was probably introduced into Arizona from southern California. Later a second collection of this species was made by the author in a Phoenix lawn where the plant was growing as a spring weed.

Cotula australis is a small annual, growing from two to six inches tall, with pinnately dissected dark green linear leaves. The flower heads are only one-eighth of an inch in diameter and greenish-white in color. The other member of the genus found growing in Arizona is **Cotula coronopifolia** commonly known as "Brass Buttons." This species was naturalized from South Africa, and prefers moist saline soils. In Arizona it has been collected at Wikieup and along the Bill Williams River. In California it grows in the salt marshes along the coast. In this species the flower heads are much larger and a brass yellow.

Although it is becoming much more difficult to find unreported plants growing wild in Arizona, it is still possible with diligent search. This is attested to by the fact that in the November 1956 edition of "Leaflets of Western Botany" five new genera and twenty-two species were reported for the state.

Cotula australis. ¼x.

CLASS FINDS EARLY WILD FLOWERS

The fall course of "A Better Understanding and Growing of Desert Plants" concluded with an all day field trip along the Bush Hwy. into the Fort McDowell Indian Reservation. This was the first time that many of those, as shown in the following photo, had had the opportunity to identify the desert trees, shrubs annuals and cacti.

It was of interest to those on the field trip to find so many newly germinated plants and many blooming earlier than usual. This was due to the unusual early rains we had in November which were about six weeks earlier than expected. If we continue with warm weather, have some rains and no freezes, we should be able to expect some fine color early in the Spring.

The class found the following shrubs in bloom: Humming-bird bush (Belephrone californica), Wild Tobaccos (Nicotiana glauca, N. trigonophylla), Wild poinsettia (Euphorbia eriantha), Desert Lavender (Hyptis emoryi), and Wolfberry (Lycium pallidum). Wild flowers in bloom were: Fiddle-neck (Amsinkia tessellata), Rock Phlox (Gilia scopulorum), Buckwheats (Eriogonum deflexum, E. wrightii), Alfilaria (Erodium texanum), Golden-crown-beard (Verbesina encelioides), Desert Marigold (Baileya multiradiata), Mustards and many compositaes.

Plants that have germinated earlier than usual and were showing indications of blooming in first part of January were: Desert heliotrope (Phacelia crenulata), Mexican poppies (Eschl scholtzia mexicana), Desert Lupine (Lupinus sparsiflora) Rock Daisies and Desert Asters.

The next course of six classes commenced Wednesday, Jan. 8th and will terminate with a field trip into the Desert Feb. 4th. The Spring course, also of six classes, will begin March 5th and finish April 9th. As this course is given in the spring, two or more field trips will be made into the desert for the purpose of identifying the wild flowers. All those persons who are interested in the desert plants should attend these classes each Wednesday at 3 P.M. There is no charge for the class — just another service the Garden renders to the community.

IMPORTING CACTI

By ROY VAIL, Richmond, Indiana

It seems that many of the people I have known are missing out on a very interesting source of cacti simply because they do not know how to go about importing the plants. Actual directions for doing this are not too often found in publications. This is my reason for writing.

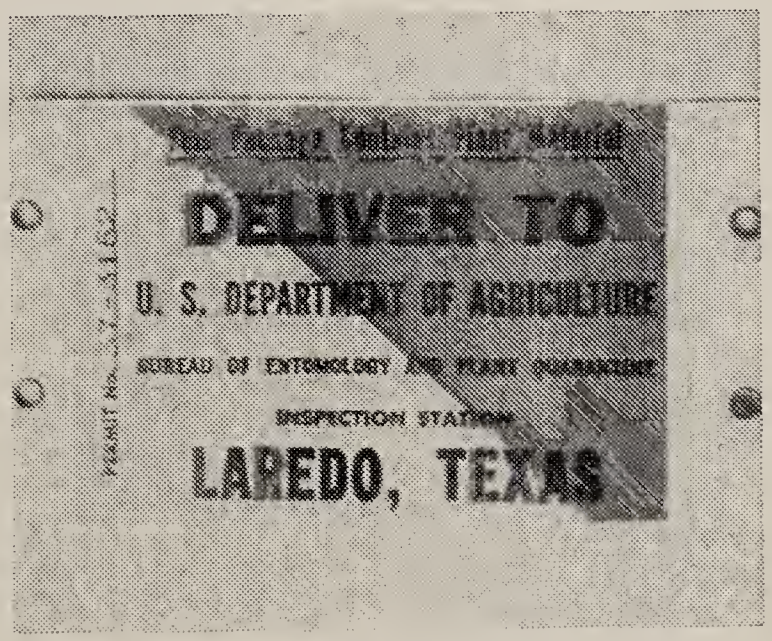
This may seem, to some, like a strange time of the year to consider this area of collecting. Actually, this is not a bad time at all because, soon the 1958 price lists will be received and it will be time for orders to be made out. The orders should be sent to the dealer sometime in the early Spring. So this is the time to be getting ready.

Perhaps the first thing that one needs to do in getting ready to import cacti is to decide from what country he is going to import. With this done, the next step is to send this information: your name and address, the name of the country, and the type of plants you wish to import (Cacti, etc.), to: U. S. Dept. of Agriculture, Agricultural Research Service, Plant Quarantine Branch, 209 River St., Hoboken, N. J., asking them for an Import Permit and Plant Tag. Only the Plant Tag, which is green and yellow, should be sent with the other parts of the order.

This is all one needs to know for the first time, but a little of the workings of the system is helpful for future importing. There are certain Import Stations on the border of the U. S. through which plants can enter. These stations inspect and treat the plants for insects, etc. One of these stations will be located most directly beween your location and that of the foreign dealer. Since you have told the Plant Quarantine Branch both locations, they will make your Permit good for the Import Station best for the shipping, and that station only. In order to import again from the same country, send for another Plant Tag for the same Import Station. Also send your Permit number as a new Permit is not needed. In order to import from a different country, send to the Plant Quarantine Branch, your Permit number, and the name of the new country. The old Permit will be revised to include the Import Station best for this new country and a Plant Tag will be sent. The Permits are now good for only one year and must be renewed.

After sending in the order, try to simply forget about the plants because it will take a long time for them to arrive. Because of the long time in transit, it is said that globular type plants are the best to import, because they stand the transit period best. I could not comment on this because I have only been interested in importing globular type cacti.

It seems that there has been an unjust stigma placed on importing cacti, but the really best way to test this method of building a collection is to try it and draw your own conclusions.



When you receive a notice that your Membership is due, will you please send your remittance as soon as possible so that we will not have to notify you several times.

KEEP YOUR MEMBERSHIP IN FORCE

CALENDAR OF EVENTS FOR JANUARY AT THE GARDEN

2nd, 3 P.M. — Lecture — Succulents other than Cactus
6th, 8 P.M. — Official Board Meeting
7th, 8 P.M. — Cactomaniacs
8th, 3 P.M. — Class — Deserts
9th, 3 P.M. — Lecture — Collecting plants in Mexico
14th, 7:30 — Class — Taxonomy
15th, 3 P.M. — Class — Desert Plants
16th, 3 P.M. — Lecture — Arizona Cactus
21st, 7:30 — Taxonomy
22nd, 3 P.M. — Class — Succulent Plants
23rd, 3 P.M. — Lecture — Arizona Trees & Shrubs
28th, 7 P.M. — Class — Taxonomy
29th, 3 P.M. — Class — Xerophytes
30th, 3 P.M. — Lecture — Arizona Wildflowers

12th, 3 P.M. — Lecture — Arizona Cactus & Wildflowers, at the Arizona Museum, Phoenix.

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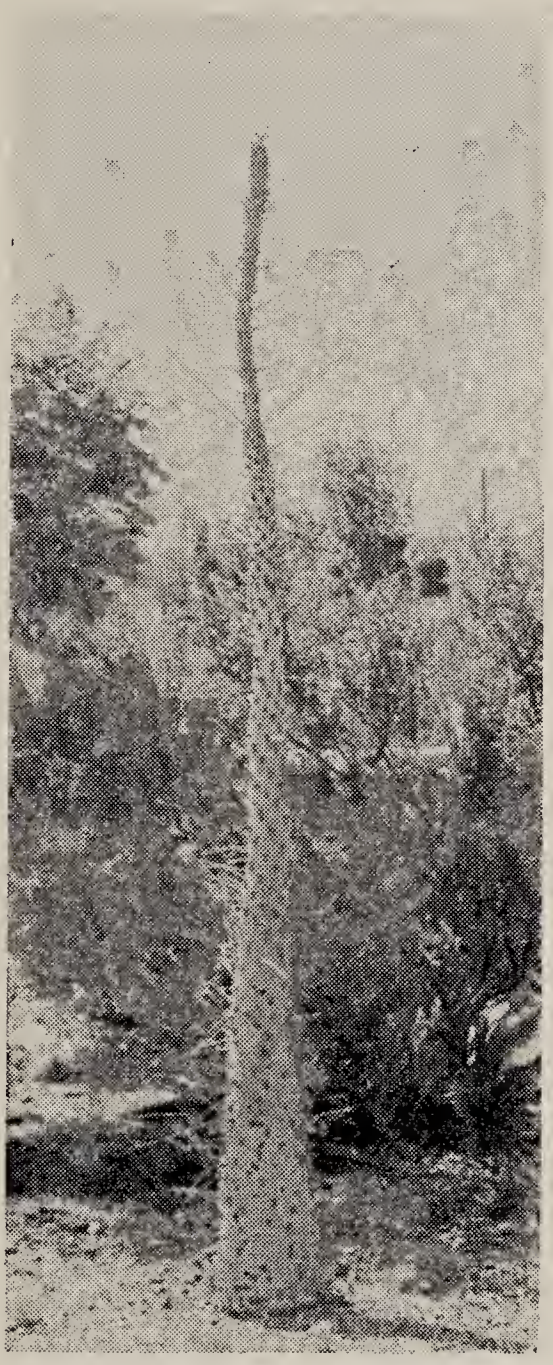
DESERT BOTANICAL GARDEN of ARIZONA

FEBRUARY, 1958



LIVING TELEGRAPH POLE
(Idria columnaris)

REG MANNING

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Volume 12 FEBRUARY, 1958 No. 2

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In November 1954, we departed from our usual format and printed a Bulletin containing the history and pictures of the Garden. Due to many recent requests, we have decided to issue this Bulletin with photographs of plants in the Garden. This Bulletin will then be slightly changed and issued as a 'Souvenir Issue' and will be available to those persons wishing a booklet showing many plants in the Garden.

Desert Botanical Garden of Arizona

STAFF

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Consulting Botanist.....James A. McCleary, Ph. D.
Assistant Horticulturist.....Dave Nevin
Assistant Horticulturist.....Wesley F. Sexton

GARDEN OPEN DAILY 9 A. M. TO 5 P. M. INCLUDING HOLIDAYS

Eleventh Annual Cactus Show

SPONSORED BY

The Phoenix Gazette

and

The Desert Botanical Garden

FEBRUARY 23RD TO MARCH 2ND

Open 9 A.M. to 5 P.M. Daily

PAPAGO PARK, PHOENIX

Interest is increasing daily as time for the opening of our 11th Annual Cactus Show approaches the opening date. Visitors are asking us daily as to when they can visit the Show. The Phoenix Gazette ran a story of the coming Show last week and many persons came to the Garden last Sunday expecting to see the Show in full swing.

EXHIBITS: The January issue of the Bulletin carried a list of the 'Schedule of Classifications' which is divided into three sections, each having from 16 to 18 entry classifications and is very easy to follow this year. Persons wishing additional schedules can obtain them from the Garden.

Oil, Water-colors and Black and White photographs of subjects pertaining to the desert will again be accepted. We hope in the near future, to have more space available for these exhibits which always attract so much interest from the visitors to the Show.

AWARDS: Three sweepstakes trophies will be awarded to the winners of the three sections. Three trophies will be given to Educational, Commercial and Art Display sections. Ten small trophies will go to the best exhibits in each of the ten sub-sections. Ribbon awards will also be given to 1st, 2nd and 3rd places plus special ribbons to those receiving Honorable Mention or Special for their exhibits.

JUDGES: We are again fortunate in having the following qualified judges from out of town who have judged plants, arrangements and gardens in various parts of the country.

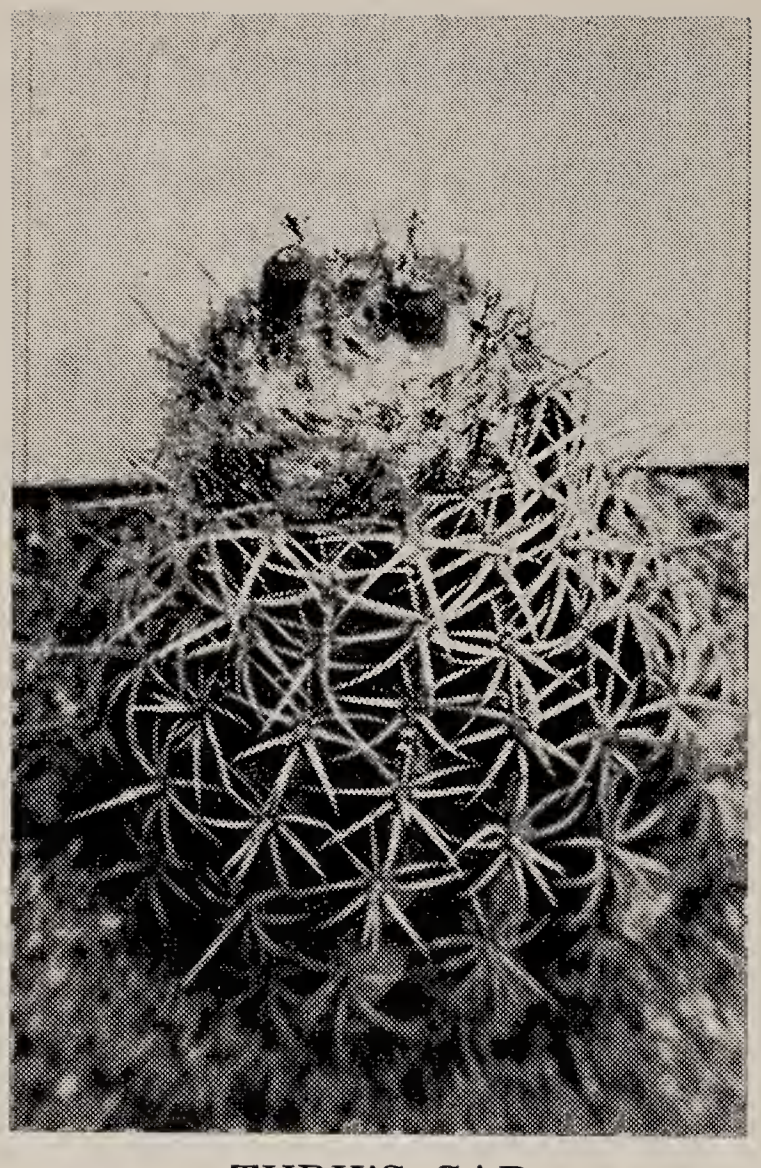
'Arrangements' — Mrs. C. J. Fuhrer, Alliance, Nebraska.

'Cacti and Succulents — potted' — John Haag, El Jardin Botanico de Santa Clara, Tucson, Arizona.

VOLUNTEERS: As in the past, the Shows would not have been as successful if it had not been for the many Members and their friends who gave of their time during the Shows. Again we are sending out an appeal asking that you contribute part of a day, a day or even several days. Positions are open for host and hostesses, sales persons, guides, tabulators, traffic control and other important jobs. The Garden will serve meals to those working during the day and coffee will be on hand at all times. Please phone BR 5-5592 and let us know what day or days that you would like to volunteer your services.

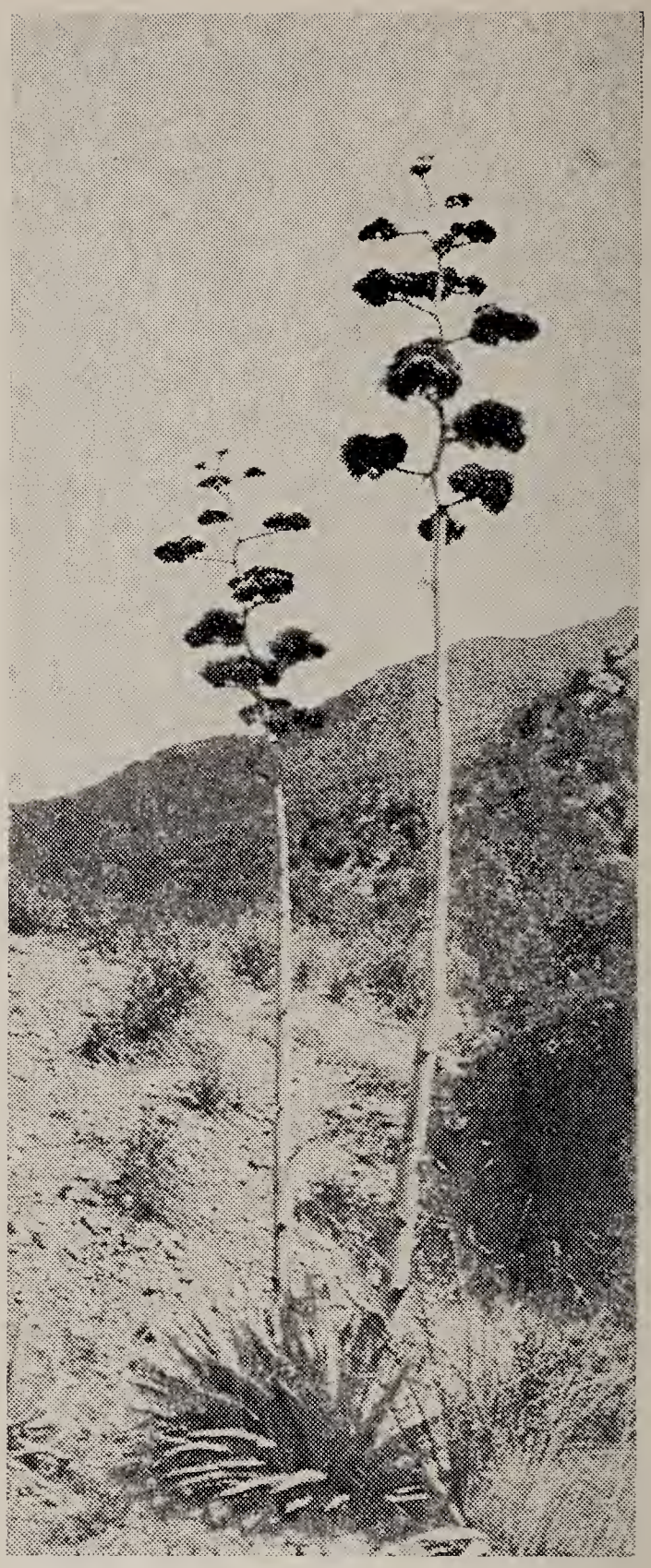
EXHIBITORS: Do you have your cactus or succulents potted and getting settled for the Show? Do not put it off till the last day and then have to pot plants after you get to the Garden as the plants will look newly potted and that will detract from their appearance.

We are again looking for more outstanding arrangements this year. They have always been quite a drawing feature of the past shows and have caused much favorable comment. Facilities are being built to accommodate arrangements 'on/or against a wall' and should prove very attractive.



TURK'S CAP
(Melocactus maxonii)

MELON BARREL
(Echinocactus alamosanus
var. platyacanthus)



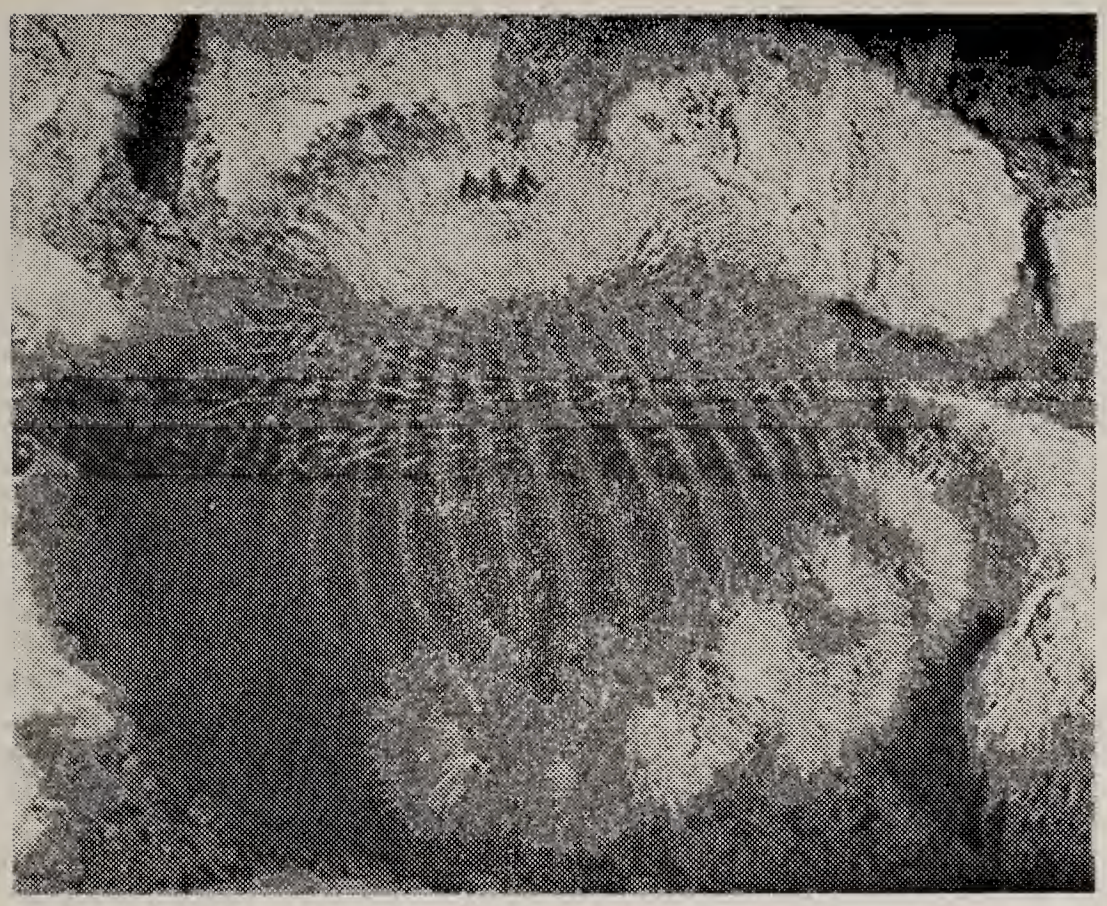
GOLDEN CENTURY PLANT
(Agave chrysantha)

SOTOL,
DESERT-SPOON
(Dasylirion
wheeleri)

SPANISH BAYONET, BANANA YUCCA (Yucca baccata)

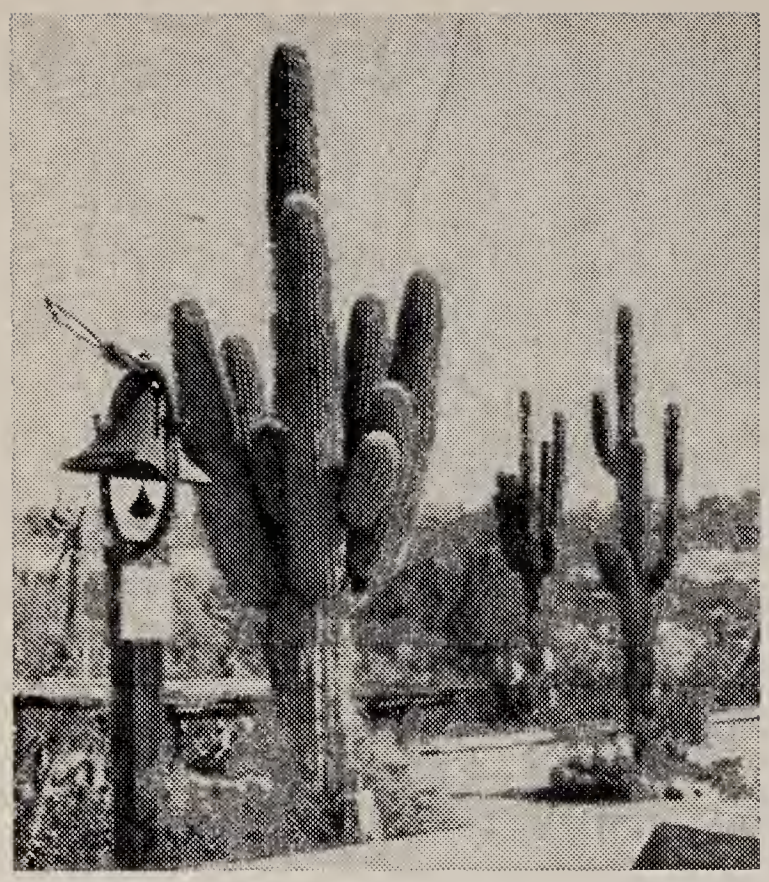
OCTOPUS CACTUS (Rathbunia alamosensis)

JOSHUA TREE (Yucca brevifolia)



GOLDEN BARREL
(Echinocactus grusonii)

FIRECRACKER CACTUS (Cleistocactus strausii)



SAGUARO, GIANT CACTUS
(Carnegiea gigantea)

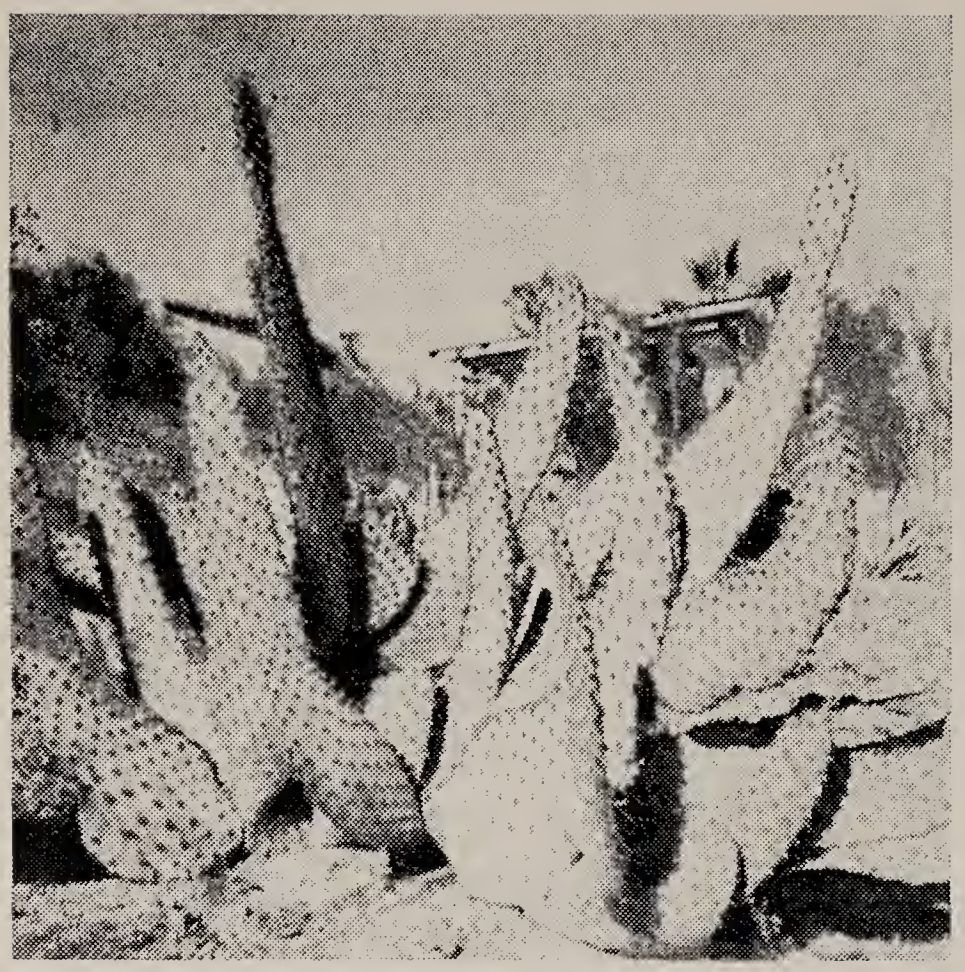
TOTEM POLE
(Lophocereus schottii
forma obesa)

CLIMBING NIGHT CEREUS
(Eriocereus jusbertii)

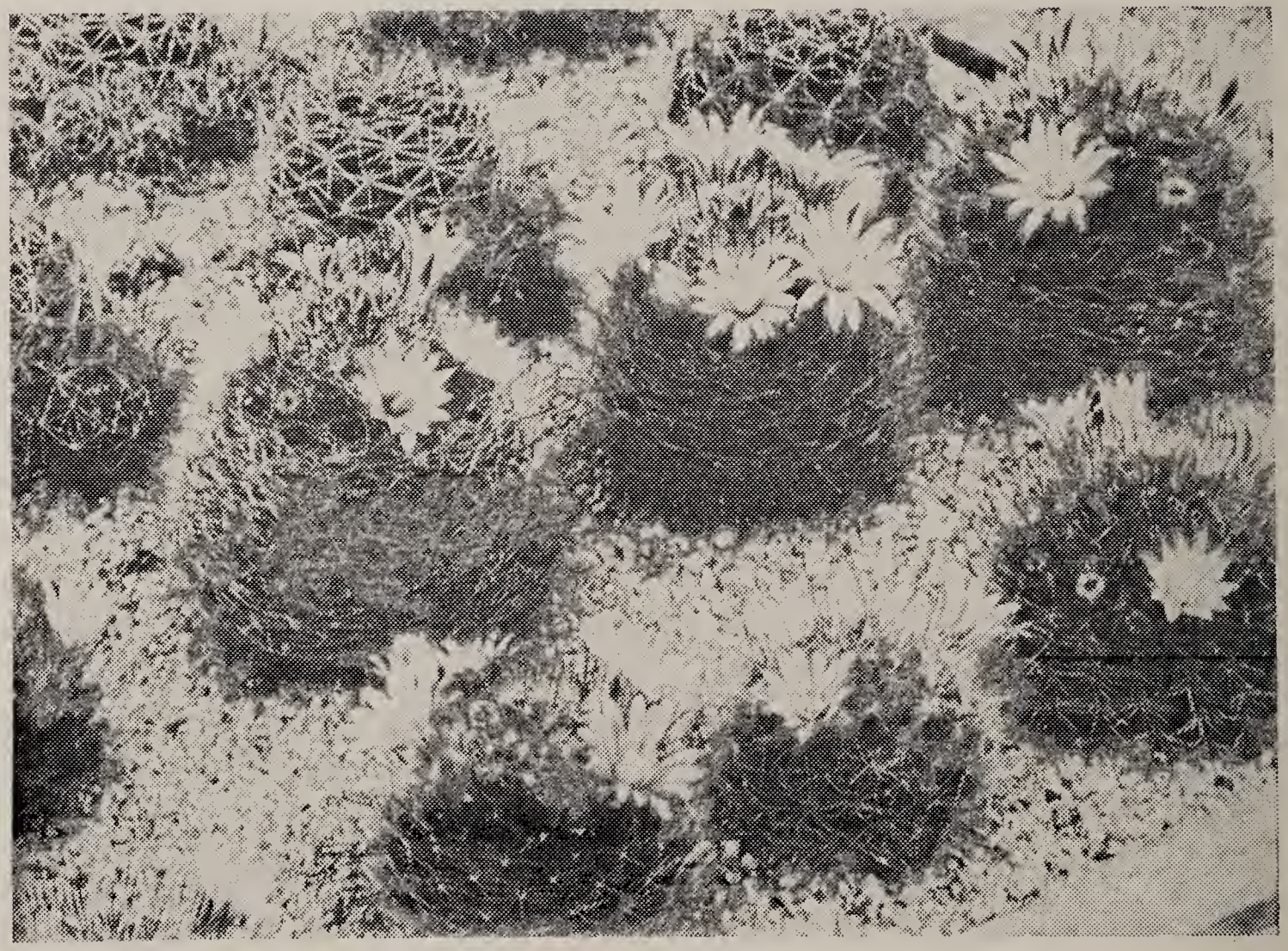
OLD MAN OF MEXICO
(Cephalocereus senilis)

STAR CACTUS
(Astrophytum
myriostigma)

CREEPING DEVIL (Machaerocereus eruca)

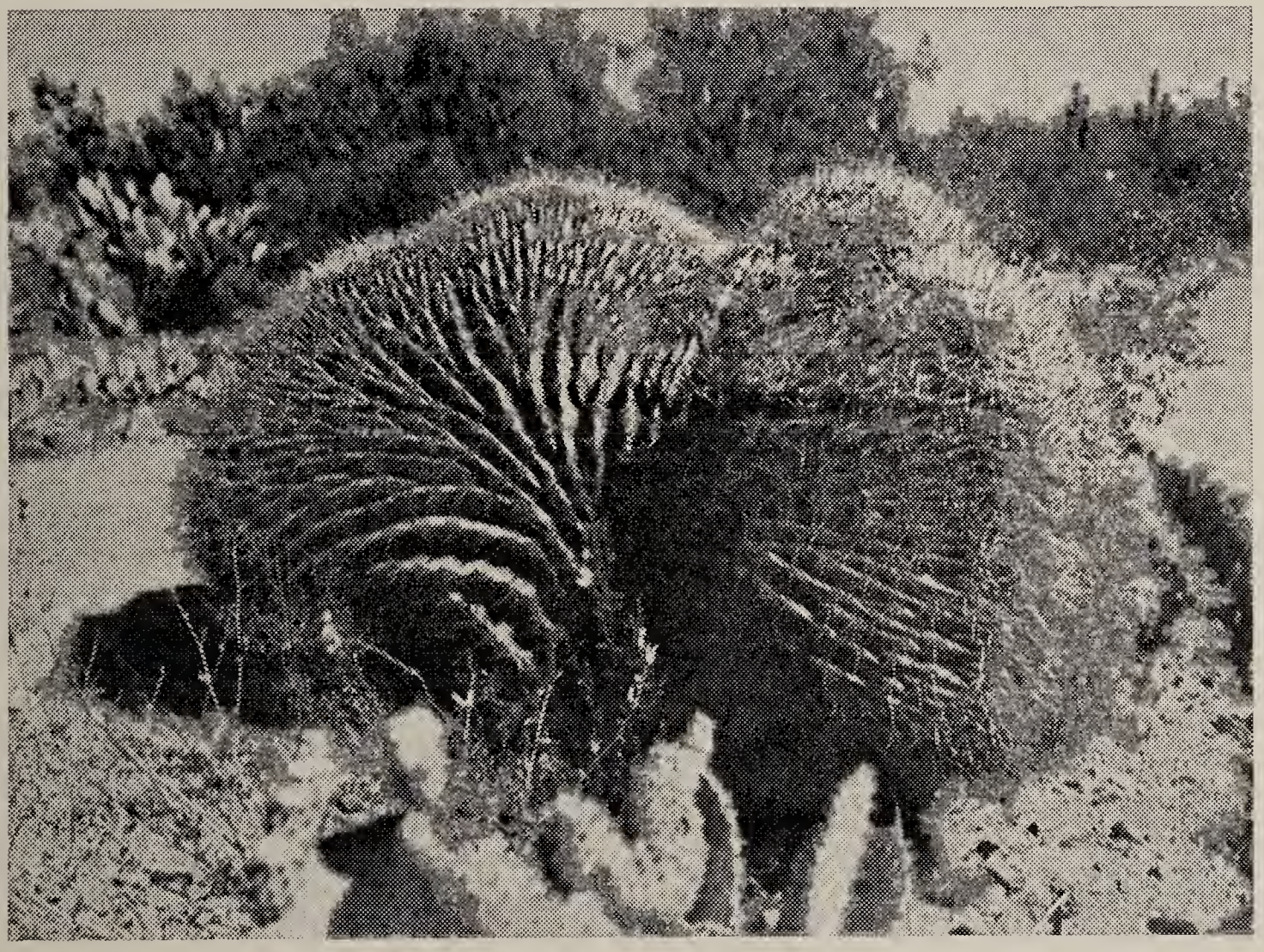


COW TONGUE
PRICKLY PEAR
(Opuntia
linguiformis)



FISH HOOK PIN-CUSHIONS Mammillaria seideliana

HEDGEHOG CACTUS (Echinocereus fendleri)



CRESTED BARREL CACTUS (Ferocactus wislizenii)

TEDDY BEAR CHOLLA, JUMPING CACTUS
(Opuntia bigelovii)

CALENDAR OF EVENTS FOR FEBRUARY AT THE GARDEN

4th 8 P.M. — Cactomaniacs
5th 10 A.M. to 4 P.M. — Field trip on the desert
6th 3 P.M. — Lecture "Birds and Animals of Arizona"
11th 7 P.M. — Class — Taxonomy
13th 3 P.M. — Lecture "Arizona Scenics"
18th 7 P.M. — Class — Taxonomy
20th 3 P.M. — Lecture "Succulents Other Than Cactus"
22nd 9 A.M. — Begin Placing Entries in Cactus Show
23rd to March 2nd, 9 A.M. to 5 P.M. — 11th Annual Cactus Show

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5th 8 P.M. — Lecture "Arizona Cactus, Wildflowers and Birds" at the Wigwam, Litchfield, Arizona
20th 10 A.M. — Educational exhibit for the Old Fashioned Garden Club Show at the Valley Garden Center, Phoenix.

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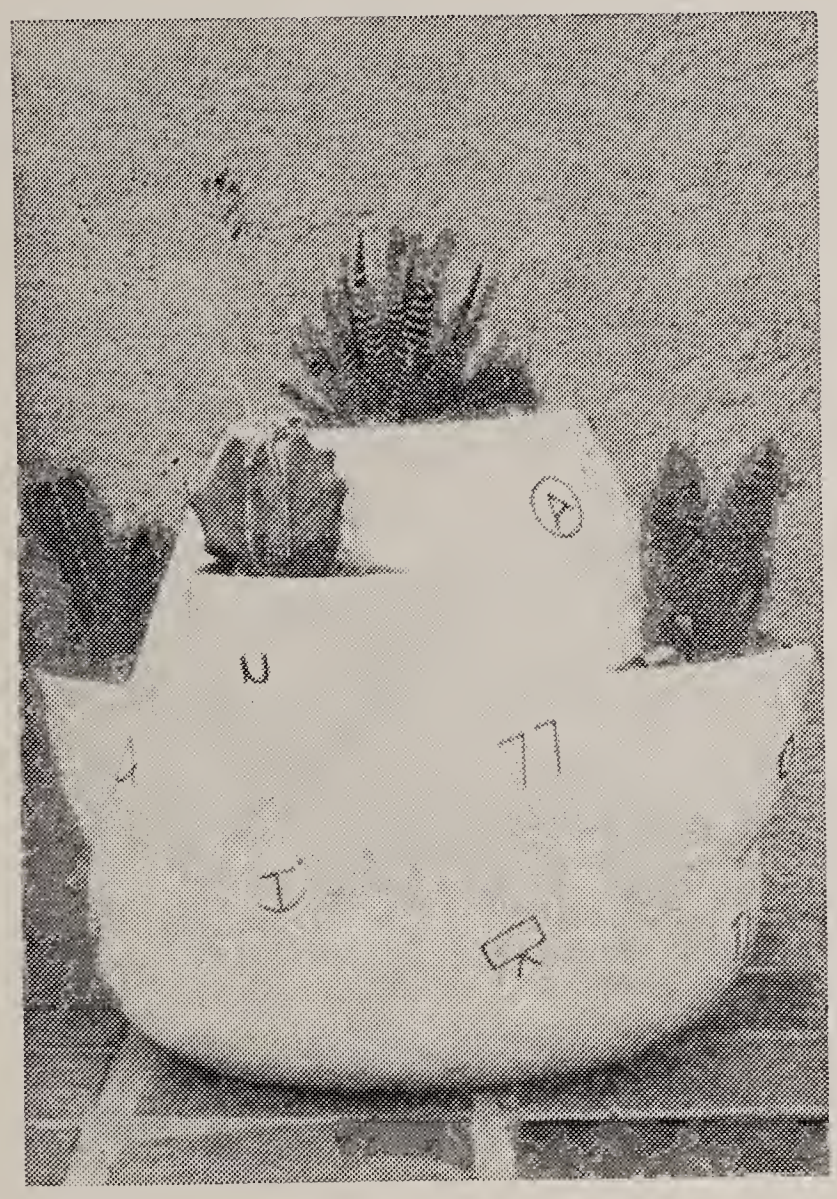
DESERT BOTANICAL GARDEN of ARIZONA

MARCH, 1958



STRAWBERRY JAR.

Designed, fired and planted by
RUTH & ISABEL, Phoenix

REG-MANNING

SAGUAROLAND BULLETIN

Published and owned by the Arizona Cactus and Native Flora Society, sponsors of the Desert Botanical Garden of Arizona, P.O. Box 547, Tempe. Saguaroland Bulletin attempts to promote the Garden and to provide information on the desert plants and their culture. Subscription $3.00 per year, the subscription including active membership in the Society and the Desert Botanical Garden. Issued 10 times a year.

W. HUBERT EARLE, Editor

Volume 12 MARCH, 1958 No. 3

Arizona Cactus and Native Flora Society

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NEW MEMBER ADDED TO STAFF. We are fortunate to again have on our staff John H. Weber, who was one of our Assistant Horticulturists in 1951 and 1952. For the past six years he has been with the Monty Lebert Nursery in Phoenix and the knowledged gained with Monty will be put to good use in our Garden. John will be our Horticulturist and have charge of the growing of all plants and seeds and the care of the thousands of plants that are in the Garden. You will find him most helpful and courteous and eager to answer any of your 'growing of plants' problems. Look him up and make his acquaintance the next time you are at the Garden.

Desert Botanical Garden of Arizona

STAFF

Superintendent.....W. Hubert Earle
Consulting Botanist.....James A. McCleary, Ph. D.
Horticulturist.....John H. Weber
Assistant Horticulturist.....Wesley F. Sexton

ALL PHOTOGRAPHS IN THIS ISSUE WERE TAKEN BY JOHN H. EVERSOLE

ELEVENTH ANNUAL CACTUS SHOW REPORT

The fast growth of Phoenix and the large influx of winter visitors helped make the 11th Annual Cactus Show the best attended in the history of the Garden. Exhibits were better than usual and the Phoenix-Gazette, who sponsored the Show, gave us unlimited space in its newspaper with fine photos by their photographer Dick Strauss and daily stories by their reporter Linn Brown.

We have had many requests from other countries for pictures of the Show's exhibits so have made this issue entirely of the exhibits of the show which were all photographed by John Eversole, Chairman of the Board of the Garden.

The Show could not have been a success without the able help of the following volunteers who deserve an immense amount of credit for donating their time: Mr. and Mrs. Dugan Lewis, Boise, Idaho, set up their suburban car on the grounds and helped for 11 days. Mr. and Mrs. Otto Friedricks, Golden, Colo., —7 days. Mr. and Mrs. H. E. Pratt—7 days. Others who helped for many days were Mr. and Mrs. Don Bauer, Warner Dodd, John Weber, James J. Cahill, Mrs. Faith Carl, Mr. and Mrs. Robert Wayland, Mrs. Arthur Holt, Mrs. Ray Ashley, Mrs. L. M. Bonnewell, Mrs. Charles Gilliland, Mrs. Mildred Hooper, Mrs. Una Miller, Mrs. Charles Mieg, Mrs. Harold Covert, Trudy Miller, Mrs. Nola Belford, Mr. and Mrs. E. C. Kraatz, Mr. and Mrs. Geo. Probert. Eighteen students of Dr. James McCleary's advanced Botany class at Arizona State College helped during the afternoons.

A big hand goes to John Hales who assumed the job of Supt. of the Show and did a grand job.

Judging of the Show was excellent with Mrs. C. J. Fuhrer, Alliance, Nebraska, judging the Arrangements, Dish Gardens and Centerpieces. John Haag of Tucson, Arizona, also did a good job on the Potted Cacti and Succulents.

AWARDS

SWEEPSTAKES

Potted Cacti — John Hales

Potted Succulents — Mrs. Harold Covert

Arrangements — Mrs. Arthur Holt

Trophy Awards

Best Cactus — Mrs. Blanche Ross

Best Succulent — Wm. Rand

Best Dish Garden — Mrs. Arthur Holt

Best Centerpiece — Mrs. Owen Lindley

Best Arrangement — Mrs. Vivian Keenan

Best Corsage — Mrs. C. Morris

Best Strawberry-jar—Isabel Baumgardner

Largest class — (Arrangements — Mrs. George Probert

Best Black & White photograph — Howard M. Soule

Best Painting — Don Bauer

Classification Awards

POTTED SPECIMEN PLANTS

Mammillaria — 1, Mrs. Harold Covert; 2 & 3, J. B. Hales.

Coryphantha — 1 & 2, C. B. Hales; 3, Chas. Mieg.

Opuntia — 1, 2 & 3, Douglas Noble.

Thelocactus — 1 & 3, J. B. Hales; 2, Chas. Mieg.

Echinomastus — 1, Chas. Mieg; 2, J. B. Hales; 3, Mrs. Blomquist.

Echinofossulocactus — 1& 3, Chas. Mieg; 2, J. B. Hales.

Lobivia — 1, 2 & 3, Mrs. George Probert.

Echinopsis — 1, Mrs. George Probert; 2, Laura Nixon; 3, Douglas Noble.

Astrophytum - Purple — Chas. Mieg; 1 & 2, Mrs. Satira Northcross; 3, Fred McClure.

Cereus — 1, Mrs. Richard Williams; 2, Mrs. Satira Northcross; 3, Laura Nixon.

Ariocarpus — 1, J. B. Hales.

Echinocereus — 1, 2 & 3, Alan Blackburn.

Gymnocalycium — 1, J. B. Hales.

Barrels — 1, Chas. Mieg; 2, J. B. Hales; 3, Warner Dodd.

Epiphyllum — 1, Mrs. Blanche Ross.

Any other species — Purple, Chas. Mieg; 1, J. B. Hales; 2, Wm. Rand; 3, Warner Dodd.

Cacti Seedlings — 1, Mrs. George Probert; 2, Don Bauer; 3, Mrs. Blomquist.

Crested Cactus — 1, 2, 3, J. B. Bales.

Euphorbia — 1, Fred McClure; 2, J. B. Hales.

Dudleya — 1, Laura Nixon.

Aloe — 1, Mrs. Nola Belford; 2, Mrs. Wayne Newlin; 3, Don Bauer.

Haworthia - Purple — Wm. Rand; 1 & 3, J. B. Hales; 2, Fred McClure.

Agave — 1, Don Bauer.

Stapelia — 1, Laura Nixon.

Crassula — 1, Mrs. Blanche Ross; 2 & 3, Mrs. Harold Covert.

Mesembryanthemum — 1 & 2, Mrs. Harold Covert.

Any other species — 1, Mrs. George Probert; 2, Fred McClure; 3, Mrs. Richard Williams.

DISH GARDENS

Cacti — 1, Mrs. Arthur Holt; 2, Mrs. Richard Williams; 3, Sally Feese.

Succulents — 1, Mrs. Richard Williams; 2, Mrs. Arthur Holt; 3, Lella Holbert.

Cacti & Succulents — 1, Mrs. Arthur Holt; 2, Mrs. Richard Williams; 3, Mrs. George Probert.

CENTERPIECES

Cacti — 1, Mrs. Harold Covert; 2, Mrs. Richard Williams; 3, Mrs. Blomquist.

Succulents — Purple, Mrs. Arthur Holt; 1, Mrs. George Probert; 2, Mrs. Richard Williams; 3, Lella Holbert.

Cacti & Succulents — 1, Mrs. Richard Williams; 2, Mrs. Charles L. Gilliland; 3, Mrs. Arthur Holt.

Dried Desert Material — Purple, Mrs. Owen C. Lindley; 1, Mrs. Vivian Keenan; 2, Mrs. Arthur Holt.

Mexican or Indian Influence — Purple, Mrs. Richard Williams; 1, Mrs. Harold Covert; 2, Mrs. Felix M. McWhirter.

ARRANGEMENTS ON OR AGAINST THE WALL

Cacti — 1, Mrs. Arthur Holt; 2, Mrs. Blomquist.

Succulents — 1, Mrs. Arthur Holt.

Cactus & Succulents — 1, Mrs. Harold Covert.

Dried Desert Material — 1, Mrs. Vivian Keenan; 2, Mrs. Arthur Holt; 3, Mrs. George Probert.

Mexican or Indian Influence — 1, Mrs. Arthur Holt.

CORSAGES

Succulents — 1 & 2, Mrs. Florence Morris; 3, Mrs. Harold Covert.

Dried Desert Materials — 1, Mrs. Florence Morris; 2, Mrs. Arthur Holt; 3, Mrs. George Probert.

MINIATURE ARRANGEMENTS — 1, Lella Holbert.

STRAWBERRY JAR — 1, Ruth & Isabel; 3, Mrs. George Probert.

EDUCATIONAL EXHIBITS — 1, Wm. Rand; 2, J. B. Hales; 3, Fred Stell.

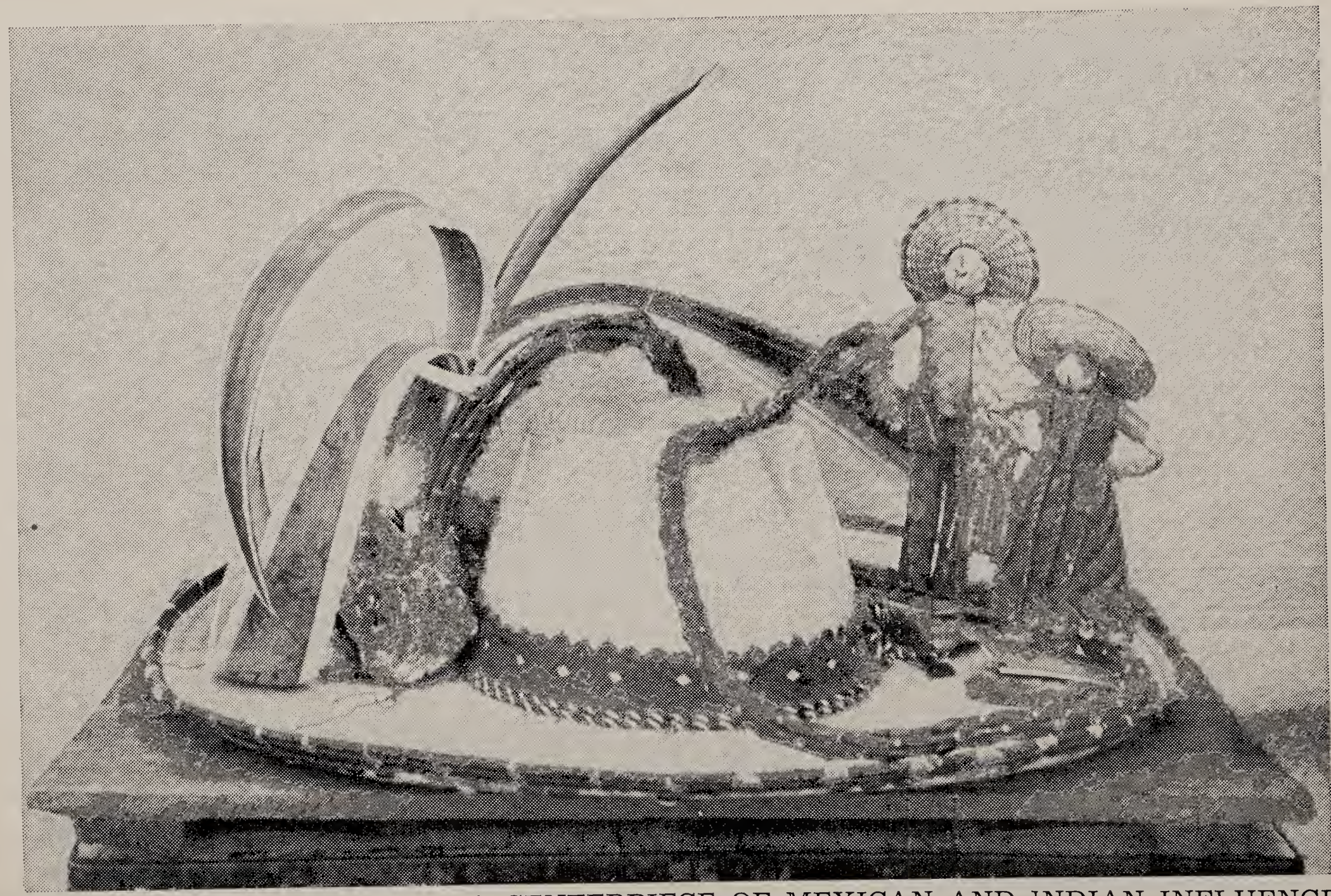
DESERT GARDEN — 1, Mrs. Hope Bailey.

BLACK & WHITE PHOTOGRAPHS — 1 & 2, Howard Soule; 3, Agnes Holst.

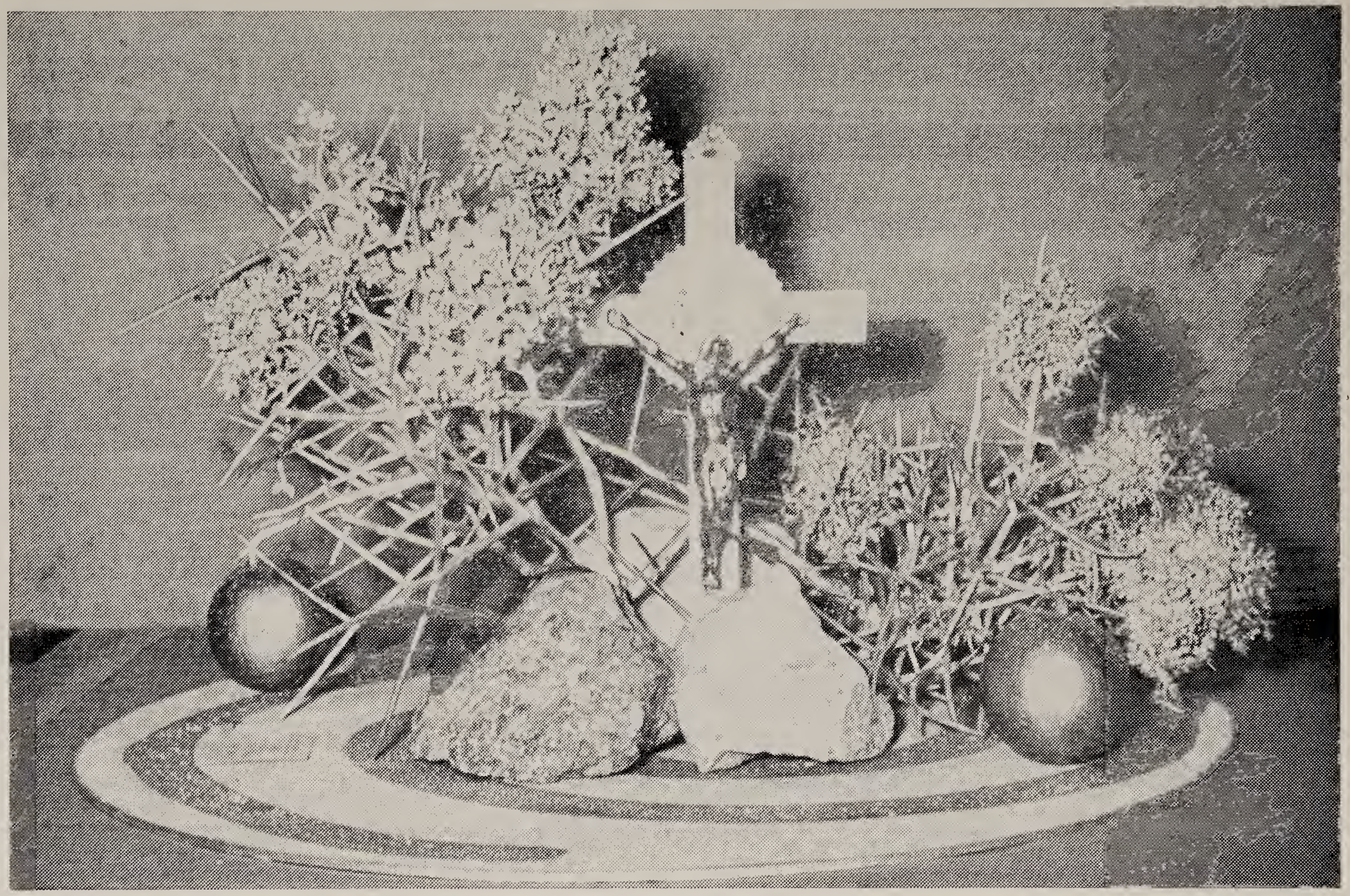
PAINTINGS, ETC. — 1, Don Bauer; 2, Sally Feese; 3, Mrs. George Probert.

COMMERCIAL EXHIBITS — 1, Sandyland Cactus Garden; 2, R. J. Buckek.

BEST CACTUS IN SHOW — Mrs. Blanche Ross, Phoenix
An Epiphyllum which is very hard to grow in the desert.



PURPLE RIBBON WINNER — A CENTERPIECE OF MEXICAN AND INDIAN INFLUENCE
Mrs. Richard Williams, Phoenix
Plants are Agave americana var marginata and Eriocereus martinii



BEST CENTERPIECE — Mrs. Owen Lindley, Tempe
An Easter arrangement using Crucifixion-thorn (Holacantha emoryi)

FIRST PLACE — CENTERPIECE OF DRIED DESERT MATERIAL
Mrs. Vivian Keenan, Apache Junction
Using unborn date-palm fronds and date fruit-stems

CENTERPIECE OF SUCCULENTS — Mrs. Harold Covert, Phoenix
Kalanchoe grandiflorum and Stapelia hirsuta

FIRST PLACE — CENTERPIECE OF SUCCULENTS — Mrs. George Probert, Phoenix
Kalanchoe grandiflorum and desert twigs

COMMERCIAL EXHIBIT OF SANDYLAND CACTUS GARDENS, PHOENIX

BEST DISH GARDEN OF CACTUS — Mrs. Arthur Holt, Phoenix
Opuntia rufida (side view), O. papyracantha and O. microdasys

SAGUARO LAND BULLETIN

DESERT BOTANICAL GARDEN of ARIZONA

APRIL, 1958

A GAUNT GIANT DEFEATED BY A MOTH

Photo by E. R. Blakley

REG MANNING

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Volume 12 APRIL, 1958 No. 4

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Desert Botanical Garden of Arizona

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Assistant Horticulturist ..... A. R. Magness

GARDEN OPEN DAILY 9 TO 5 P. M. UNTIL MAY 31st

MARCH IN THE GARDEN

A most successful meeting of the Garden's two boards, Executive and Advisory, was held March 10th at the Garden. Plans and an agreement were drawn up by the Executive Board Chairman, John H. Eversole, for a co-operating working agreement with the Arizona State College at Tempe. This arrangement would allow the college and its students the use of our facilities for their research work. Much work is yet to be done on this agreement and its final draft will be presented at the Annual Meeting in April.

Les Mahoney, Chairman of the Advisory Board, presented a detailed plan for the future expansion of the Garden that would tie-in with the City of Phoenix's Papago Park Proposed Plan. This is the first time that we have had an overall drawing of the Garden presented to the Board and it was met with hearty approval.

The Garden Committee of the Board was asked to begin the expansion program by first making a new overflow parking lot as our present lots have been so inadequate the past years. The Committee lost no time as Chas. Mieg, one of its members, swung into action and supervised the construction of a new lot that will take care of 160 cars. The lot is now in use and of big help especially during the heavy week-ends.

Landscaping is now in progress around the parking lot, the main entrances and along the fences. As extra plants are available from the Garden, they will be added to these entrance plantings during the summer.

ANNUAL MEETING

The Annual Meeting of the Arizona Cactus & Native Flora Society, Inc., which sponsors the Desert Botanical Garden will be held Sunday, April 27th at 3 P.M. in Webster Hall. All members are urged to attend to hear the various reports and plans for the future.

An election of officers will also be held at that time. A ballot for the election of members of the Board is enclosed in this Bulletin and we ask you to vote for the three members as shown or use the additional lines for 'write-ins' and mail the card at once.

HELP !

Recently we had an inquiry from Cimarron, Kansas asking if we would send them some "Cactus Oil." Could some one please let us know what and where 'cactus oil' can be obtained so that we could get this inquiry out of our unanswered mail basket. Thank you! We get the strangest requests.

Also our Mind Reading Department is functioning in fair order. Just recently we had a request from an elderly lady, visiting the Garden, who asked us to point out to her a 'Street-walker.' Her daughter had told her they were quite common on the desert. After a slight pause we realized she was referring to one of our strange desert birds, the "Roadrunner."

THE GIANT CACTUS — DISAPPEARING?

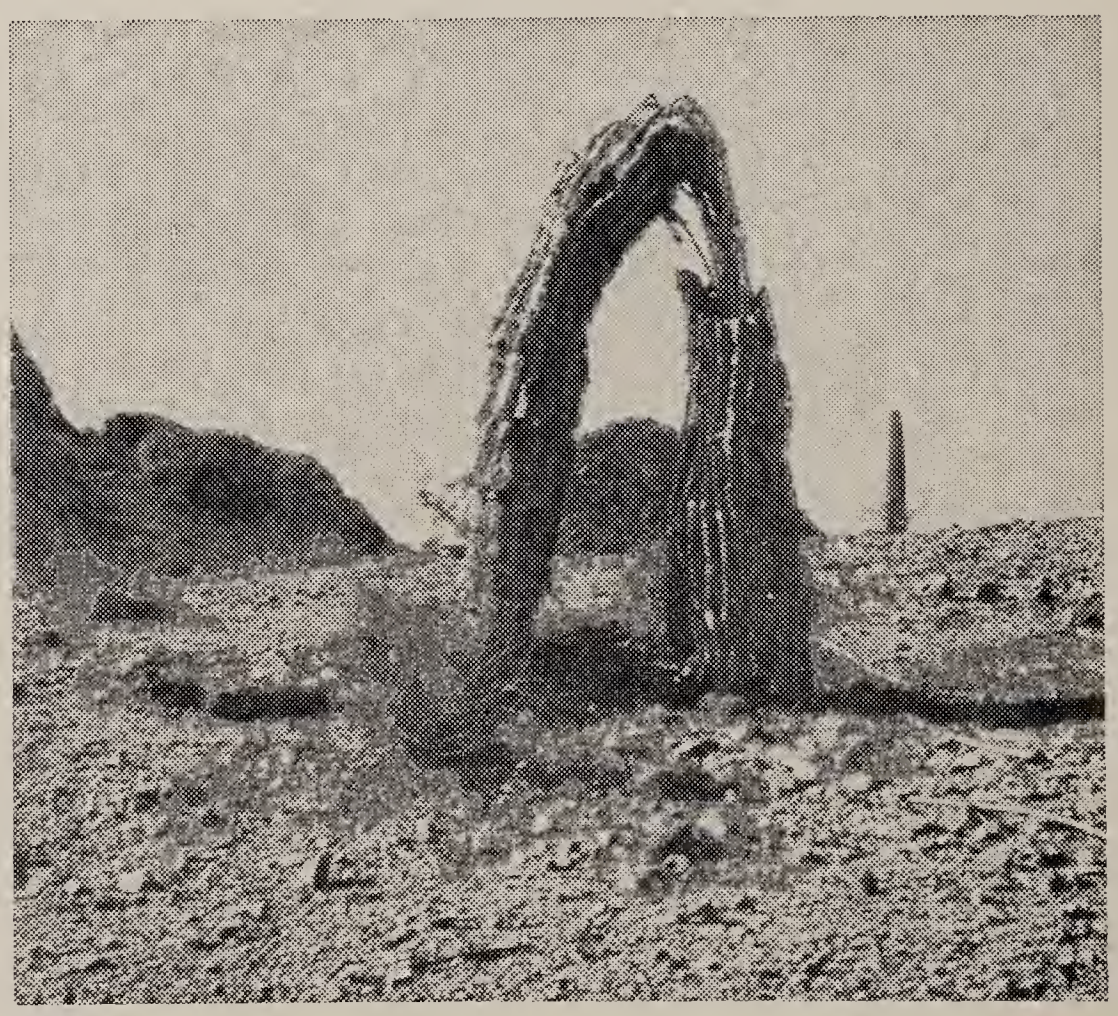
Much has been written and said about the Giant Cactus of Arizona, commonly called the Saguaro and botanically referred to as Carnegiea gigantea, disappearing from our Arizona desert.

Research over the past decade shows that the Saguaro is being somewhat depleted by a bacterium (Erwinia carnegieana) carried in the intestines of the larvae of a moth (Cactobrosis fernaldialis). This moth lays her eggs in the tissue of the Saguaro and as the larvae eats the soft tissue of the Saguaro the bacterium is then spread thru these tissues and thus spread thru the entire plant. This can be a slow process in the summer months but during the rainy period the bacterium spreads very rapidly.

An old cactus is usually weakened due to age and cannot seal off this infection as well as can a young and more vigorous Saguaro. Thus most of the Saguaros that die due to the disease are the older ones whose span of life is just about completed — approximately 175-200 years.

But, what is killing off the younger plants that we see rotting and those laying on the desert?

Drive along the desert roads and view with misgivings the damage that is being done daily by Homo sapiens to the stately Saguaros. Look at a plant that is rotting and you will see either axe, knife, shotgun or high-powered rifle wounds in the plants. If these wounds are inflicted during a dry period the Saguaro will excrete a liquid that hardens on contact with the air and forms a callous over the wound. But if the injury is caused during a rainy or moist period, the plant will not have as good a chance of forming a callous as the liquid, being excreted by the Saguaro, will be 'thinned-out' by the moisture thus leaving the wound open for rot to enter and spread thru the plant.



Saguaro that has died due to infection caused by a moth.

A section of a saguaro showing its continual battle to seal-off wounds with a callousing action.

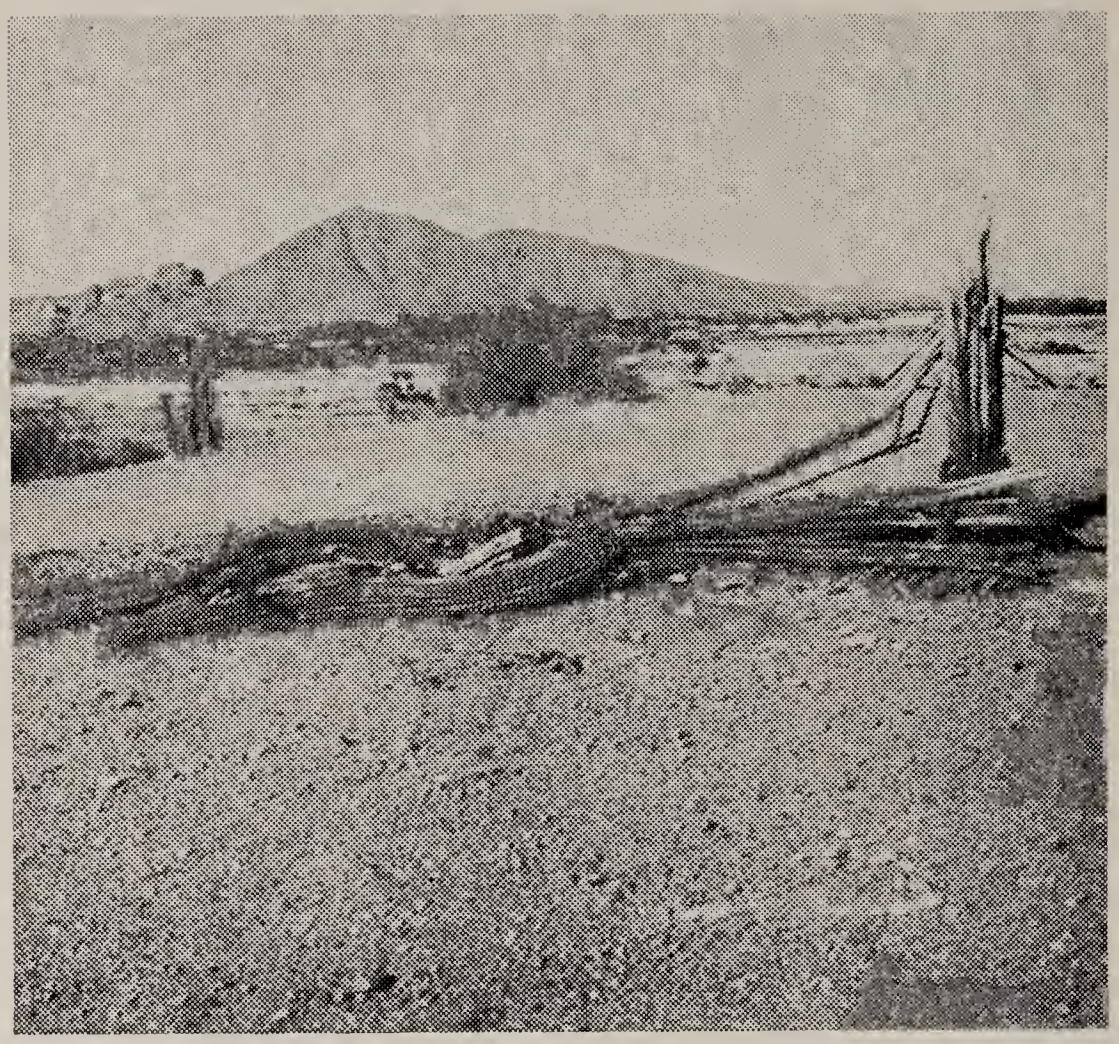
Look at a young Saguaro lying on the ground and observation will likely reveal that it has been maliciously pushed over by persons or has been 'bumped' intentionally by the bumper of either a car, jeep or truck.

Remember that it takes 60-70 years for a Saguaro to reach 7 to 9 feet which is its approximate first blooming stage. Many of these giants on our desert are nearly two hundred years of age and weigh up to 6 tons. They are of about 80% moisture and are strengthened with stout vascular rods. The Saguaro will withstand terrific winds as they are streamlined and well balanced on a pivot-root with its main roots running out in all directions similar to the spokes of a wheel.

In carefully preserved areas, i.e. where persons are prohibited to travel, hike or picnic, surveys show that there is a rapid increase of the saguaros as they have a better chance to propagate undisturbed. But when these areas are reopened to the public the saguaros are soon mutilated, kicked and dug out of the ground. We have State laws which prohibit the mutilation and destroying of desert plants but these laws are refuted daily.

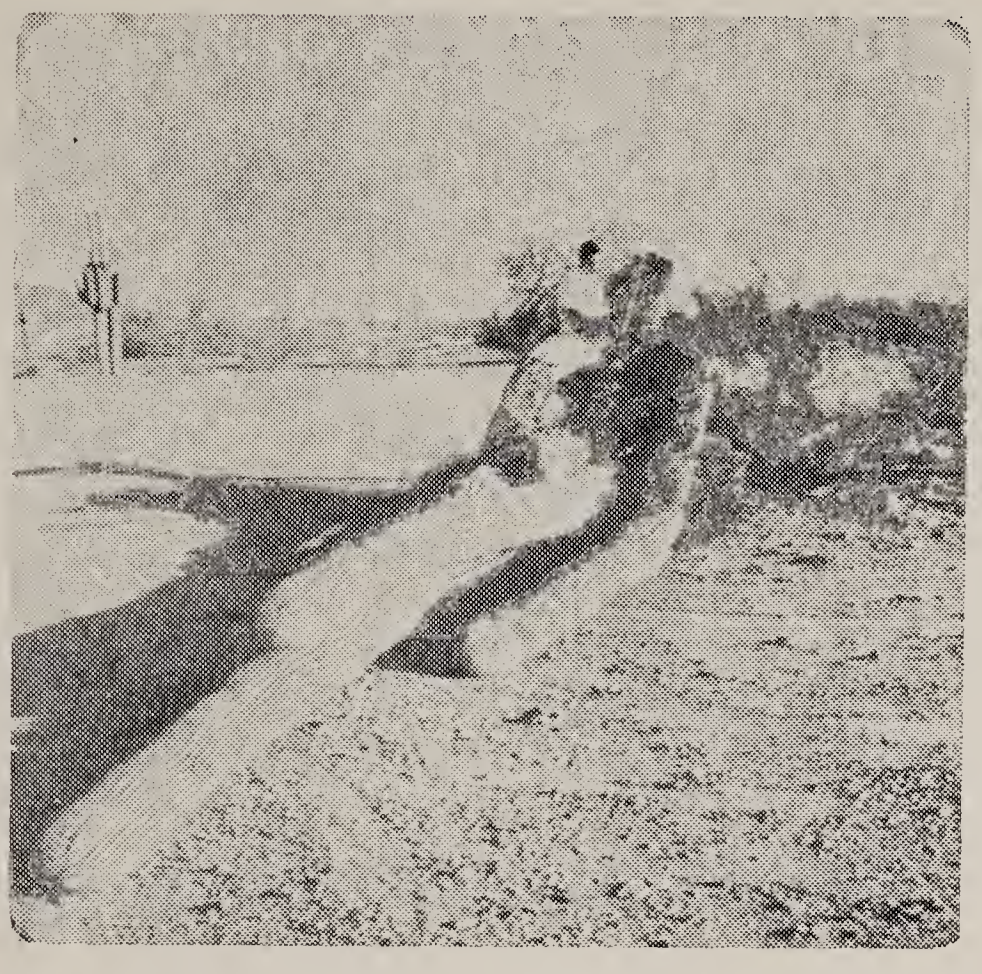
The blame of our disappearing Saguaros should not be placed on the poor little moth but on the ecological conditions that arise as new communities mushroom on the desert, new cities arise and subdivisions creep into the desert with man destroying what may stand in his pathway.

We are fortunate in that we have National Monuments, Parks and restricted areas in our State wherein the Saguaro will always be protected. It is up to these agencies and we who live on the desert to further the proprogation of the Saguaro by planting seeds and seedlings for future generations to enjoy.



Saguaro chopped down with an axe at waist height.

Young saguaro with its head lopped-off by an axe. Sections of the plant can be seen lying at its base.



Saguaro was cut into by vandals. Infection set in and plant had to be chopped-down as it became a hazard to tourists.

Saguaro that has been wantonly knocked over by the bumper of an auto.

NATIONAL SHADE TREE CONFERENCE

The Garden was invited to attend and become a member of the above Conference which had its Regional meeting at the Boyce-Thompson Arboretum, March 7th.

This organization is composed of arborists, horticulturists, and individuals actively engaged in commercial arboriculture, who represent or are employed by governmental or other non-commercial agencies, organizations or institutions, whose principal duties are concerned with research, instruction, control, supervision, design, maintenance of or pertaining to trees, parks and forests and to other individuals actively interested in shade tree welfare.

The purposes of the Conference are

1. To improve the practice of Tree Preservation.
2. To stimulate a greater interest in the planting and preservation of shade and ornamental trees.
3. To cooperate in the conservation of trees and in the beautification of the countryside.
4. To initiate and foster scientific investigation of the various problems encountered in the practice of Tree Preservation, and to publish the results of such investigation.
5. To sponsor an annual meeting devoted to the exchange and presentation of information that will aid in the improvement of the practice of Tree Preservation.
6. To afford the manufactures of material or equipment used in the practice of Tree Preservation an opportunity to introduce and demonstrate their products to practicing arborists.

It may seem strange to some that a Desert Botanical Garden should be interested in Shade Trees. More and more trees of the desert are being used for landscaping purposes around desert homes and as it takes some time to grow desert trees it is very important that these trees be located in the proper position around the homes as to afford the correct shade and not interfere with power lines as they grow up. Developers of desert areas are continually asking for suggestions as to what trees and shrubs can be planted and how they should be located in their areas.

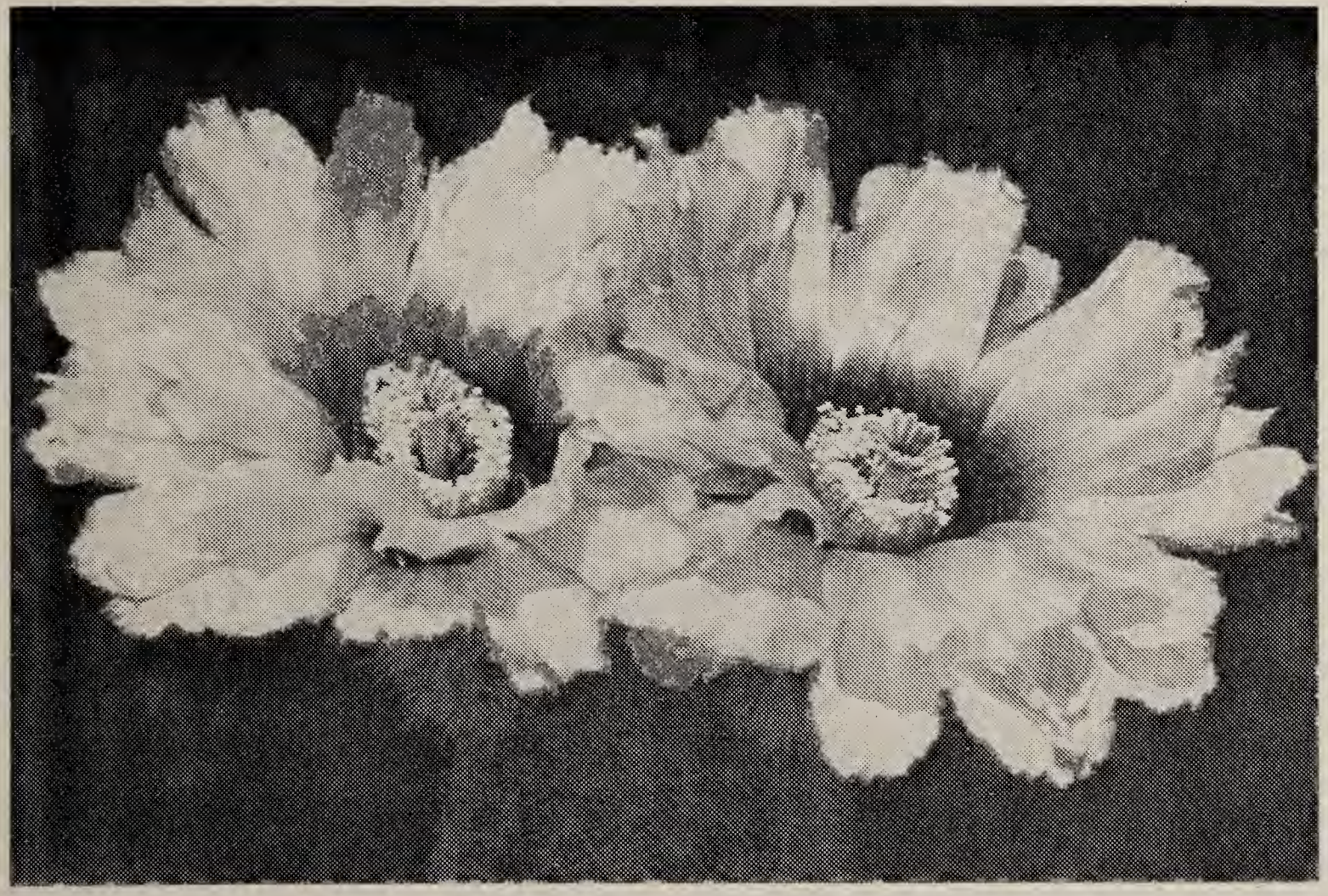
In planting a tree it is very important that you take in consideration the following precautions: Will the tree grow up into a power line and later have to be sawed down or moved? Will it interfere with concrete walls or driveways and cause them to crack? Will its roots get into sewer lines? Will it be a tree that is always dropping branches and bark? Will it have to be moved for widening of streets and highways in a few years?

The Public Service Light and Power Co. of Phoenix has seven trucks and crews who spend all their time trimming tree branches which are or will interfere with the power lines. Cost of this operation is over $150,000 a year and is charged to the consumer. Proper planning and foresight would save many a dollar.

NEW MEMBER ADDED TO STAFF: A. R. Magness and his wife, Elsie, have recently moved into the Garden's apt. "A. R.", as he is known, is of Flagstaff, Ariz., and will be another of our Assistant Horticulturists. He has had experience in photography and will be of great help in obtaining photos for this Bulletin.

SOMETHING ABOUT ECHINOCEREUS

Most of the earlier friends of cacti gathered cacti like amateurs. When they liked a cactus, it was acquired and put into a collection. Thereby such an amateur got a variegated, striking collection. The etiquettes were lost and the names were forgotten. These nameless cacti were propagated, went from hand to hand and today it is very difficult for science to determine these plants, because the earlier descriptions were not quite exact. Not repeating the old mistakes, many friends of cacti resolved to gather only a genus of cacti. This is more pleasing and interesting, because some of the species and varieties of one genus are easy to get. The rest of the species one must look for throughout the whole world of cacti. You will receive plants from all over the world by writing to foreign friends of cacti, to gardens, and to collectors of cacti but unfortunately not all plants will have correct names. All lists of seeds must be looked over to find new species. Again you will meet with surprises, as the dealers often sell new names in order to fill their catalogues. The best way is to acquire seeds of the same species but from different firms. After 2-3 years you can compare the seedings with the original descriptions and establish the correct name for each plant. The species, which were collected and described decades ago quite often are difficult to obtain now, because during the last war most of the old European collections were lost. Also was mine.



Echinocereus Fitchii — Photo by A. Schmid

In 1950 I began to collect cacti again, but this time my aim was the large genus of Echinocereus, and all related genus in my greenhouse. The reason of this preference was the beautiful flowers, which often show their splendor for seven days. I began with the green prostate plants, because they flower in simple culture every year. The other beautifully spined plants had to be grafted at first. Today grafting is not necessary any more for most of the plants, because they grow as well as they do in their own country if one provides a very sandy and acid soil. To achieve a stout and natural growth of the Echinocereus, young seedlings or offsets are grafted and during middle of May they are put in the open air. As grafting stocks I most times use the South American Trichocereus pasacana. On this stock the graft grows slowly, but keeps its natural appearance. If I take other Trichocereus or Opuntia as grafting stocks, the grafts will be cut and then by-rooted when reaching the blooming size. The Echinocereus re-rooted in the open air, look like healthy import plants. To get them to grow quickly, I take Cereus jusbertii as grafting stock.

The cultivation of Echinocereus is very simple. Early in spring, the plants are put into the cold frame. When they get accustomed to the sun, they shoot buds. Now they are sprinkled and watered regularly. After blooming, the windows are taken off the cold frame. From July till autumn water must be given sparingly and at the beginning of the cold weather the plants will be slightly shrunk and hardy enough to endure below zero temperatures during the winter. Echinocereus from Colorado even stand —26°, when kept completely dry.

The genus of Echinocereus is very numerous and includes more than 100 various species. Only a few friends of cacti have room enough to assemble all the different species in their collection. The green types, either with upright or prostrate branches build large clusters and are only suited for collections if ample space can be provided. Echinocereus berlandierii, E blankii, E. conglomeratus, E. dubius, E. glycimorphus, E. merkerii, E. pentalophus, and E. procumbens belong to this type. When these plants are in a sunny place, they flower beautifully. The short bodied and clustering plants are more interesting. Echinocereus coccineus, E. fendlerii, E. sarissophorus, E. stramineus, E. viereckii and the copper-red flowering varieties of E. salmdyckianus belong to this group.

Very desired are the Pectinati. They have shortly ovate or oblong bodies, which are thickly adorned with appressed spines. Many of these varieties show in their growing center beautifully lilac-rose-colored spines. Others have various horizontal bands with different colored spines, hence the name "rainbow-cactus." I observed two strikingly different shapes of flowers among the large number of Pectinati. Some of them have funnel-like flowers while others open widely as shown in the picture. The latter flower more easily. Echinocereus fitchii, E. melanocentrus and E. purpureus belong to that group.

Striking are the long spines of the E. baileyi. The different varieties received their names according to the color of spines.

Very interesting are the almost spineless sorts, as are: Echinocereus cucumis, E. luteus, E. nocturniflorus, E. knippelianus, E. subinermis, E. pulchellus and var. amoenus.

There still exist some subspecies and outsiders, E. paucispinus and E. coccineus var. inermis, which I don't want to put down as it might cause confusion amongst the friends of Echinocereus. I shall only mention the dwarfy Echinocereus viridiflorus with its two varieties. Striking are the diffirently colored, small spines and the light-green blossoms.

Occasionally I shall report more specifically in order to introduce all the known species to cactus friends.

OSCAR SCHMID,
Aspernstrasse, Austria.

Top 4 plants — Echinocereus Pectinatus
Center plant in blossom — Echinocereus Albinspinus
To the right and below the above plant — Echinocereus Purpureus
White plant, lower left — Echinocereus Delaetii
Lower right — Lobivia Sp.
Photo by A. Schmid

A healthy stand of saguaros in the Saguaro National Monument east of Tucson, Arizona. Much research is being conducted in this area by the United States Department of Agriculture and the University of Arizona, to perpetuate the continued growth of the saguaros.

CALENDAR OF ACTIVITIES FOR APRIL

1st	8 P.M.	Cactomaniacs Monthly Meeting
2nd	3 P.M.	Class - Identification of Desert Shrubs
3rd	3 P.M.	Lecture — Arizona Scenics
8th	8 P.M.	Class - Use of different soils
9th	8 A.M.	Class Field Trip to Joshua Tree Forest Area
10th	8 A.M.	Educational exhibit at Mesa Garden Club
10th	3 P.M.	Lecture — Succulents other than Cactus
12th	11 A.M.	Arizona Academy of Science (Phoenix College)
12th-13th		Educational exhibit at Scottsdale Garden Club
15th	7 P.M.	Class — Taxonomy
17th	8 A.M.	Audubon Club Field Trip to Coon's Bluff
17th	3 P.M.	Lecture — Arizona's Cactuses
22nd	7 P.M.	Class — Taxonomy
24th	3 P.M.	Lecture — Arizona Wildflowers
27th	3 P.M.	Arizona Cactus & Native Flora Society, Inc. Annual Meeting
29th	7 P.M.	Class — Taxonomy

SAGUARO LAND BULLETIN

DESERT BOTANICAL GARDEN of ARIZONA

MAY, 1958

ROSE COLLOM

(See page 56)

REG MANNING

SAGUAROLAND BULLETIN

Published and owned by the Arizona Cactus and Native Flora Society, sponsors of the Desert Botanical Garden of Arizona, P.O. Box 547, Tempe. Saguaroland Bulletin attempts to promote the Garden and to provide information on the desert plants and their culture. Subscription $3.00 per year, the subscription including active membership in the Society and the Desert Botanical Garden. Issued 10 times a year.

W. HUBERT EARLE, Editor

Volume 12 MAY, 1958 No. 5

Arizona Cactus and Native Flora Society

EXECUTIVE BOARD

Chairman of Board ... John H. Eversole
President ... Lou Ella Archer
Vice President ... John H. Rhuart
Treasurer ... Tom Goodnight
Secretary ... Angela Bool
Chief Counsel ... William Eliot
Chief Counsel ... William Eliot

BOARD MEMBERS

Edward L. Burrall
Charles Mieg
Mel Hinman
Reg Manning

Chairman of the Advisory Board — Leslie J. Mahoney

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Desert Botanical Garden of Arizona

STAFF

Director ... W. Hubert Earle
Consulting Botanist ... James A. McCleary, Ph. D.
Horticulturist ... John H. Weber
Assistant Horticulturist ... A. R. Magness
Assistant Horticulturist ... Wesley Sexton

GARDEN OPEN DAILY 9 TO 5 P. M. UNTIL MAY 31st

ANNUAL MEETINGS

The Annual meeting of members of the Arizona Cactus and Native Flora Society, which sponsors the Desert Botanical Garden, was held in the Webster Auditorium Sunday, April 27th, with a larger showing of members than usual. Ballots were counted to fill the three vacancies on the Executive Board and incumbent members John H. Eversole, Tom Goodnight and Mel Hinman were unanimously reelected to office.

Reports were given on the activities of the past year and the Garden's financial condition.

The Annual Board meeting was held at the Desert Hills Hotel, May 14th, with a dinner for the Board members and their wives and husbands, with an attendance of 24 participating in the meeting.

After the dinner an election of officers to the Board was held with members assuming the following positions:

Chairman — John H. Eversole.
President — Lou Ella Archer.
Vice President — John Rhuart.
Treasurer — Tom Goodnight.
Secretary — Angela Bool.
Chief Counsel — Wm. Eliot.

Advisory Board Chairman — Les Mahoney.

Reports were given as follows:

Board Meetings — John Eversole.

Financial Statement — W. H. Earle for Tom Goodnight.

Cooperative Arrangement with Arizona State College and Desert Botanical Garden — Dr. James McCleary.

Garden Committee — Charles Mieg.

Present status of Papago Park — Wm. Eliot.

Future plans of the Garden — Les Mahoney.

The Board was most happy to learn of its fine financial position. This is due to several factors. First, our members have renewed their memberships faithfully and many have increased their giving. Secondly, the Garden has been open daily since last fall from 9 to 5. Thirdly, the attendance has been greater and the Garden has issued invitations to all conventions convening in Phoenix. Fourthly, we have passed out over 10,000 brochures to motels, hotels, etc., inviting persons to visit the Garden.

The same manner of continued promotional work will go on next fall and winter with additional newspaper coverage. We have been most fortunate in the past with the good features and articles published in the Phoenix-Gazette and other Valley papers throughout the tourist season.

The Board voted to place $3,000 of our net cash into a Capital Improvement fund. Also all future sales of seeds, plants and contributions would go into this fund.

Since the inception of the Garden, there has always been the problem of finances. During the past ten years the big fear was how to get thru the lean summer months. The summer of 1958 will have no such fear and our time can then be spent on improving the Garden's plantings and proprogate more plants for future plantings.

You, as members of the Garden, will be most happy to analyze the Financial Report on the following page.

FINANCIAL REPORT

May 1, 1957 to April 30, 1958

INCOME

Retail Sales	$15,836.47
Contributions	792.56
Memberships	2,058.50
Wholesale Sales	694.36
Endowment Income	11,665.98
Miscellaneous	751.32
	$31,799.19

OPERATING EXPENSES

Retail Purchases	$ 8,451.17
General Expenses	3,322.33
Auto Operation	654.07
Utilities	1,135.05
Insurance	608.91
Salaries	11,485.32
Miscellaneous	788.07
	$26,444.92

ASSETS

Accounts Receivable		$ 49.38
INVENTORY		
Arizona Cactuses		63.00
Introduction Desert Plants		278.00
Retail		1,258.00
Deposit with Industrial Commission		96.00
Cash		
Valley National Bank		10,109.26
First Federal Bank		514.91
Petty Cash on hand		20.00
Total Assets		$12,388.55

LIABILITIES

Reserve for Federal Tax Withheld	$124.44	
Reserve for State Tax Withheld	5.26	129.70
NET		$12,258.85

Gertrude Divine Webster Trust Fund $219,705.60
Valley National Bank - Trustee

Improvements cost included with 'general expense' and 'salaries.'

Fencing along canal (fencing now completed)	$423.29
Parking Lot to date	334.00
Addition to Glass House	44.53
	$801.82

* * *

Memberships May 1, 1957 435
Memberships April 30, 1958 475

* * *

YOUR EXECUTIVE BOARD

When you receive your ballot and are requested to vote for 3 names for the executive board and look at the vacant spaces for "write-ins," have you ever wondered what this is all about. I admit freely that I was rather disturbed over the method by which this Board is elected and began to look into the matter for my own satisfaction. Then one day a few years ago I found my own name on the ballot and in due course became a member of the Board.

Why are no other names available? With this question I confronted the late W. T. Marshall. And he explained as follows: The list of members used to be published annually and at the request of a major section of the membership this practice was discontinued. It seemed that these lists found their way into the hands of various dealers and other promoters who solicited business, or funds from this handy "sucker list." Thus it comes about that few members know but very few of their fellows in our organization. That left the question of who is put on the printed ballot and why.

Your executive Board has the prime responsibility for keeping the Botanical garden in financial good health. To plan new additions, projects and programs to insure a healthy growth in accordance with our charter. While Mr. Marshall lived, he was given very much a free hand in his planning and proved a very capable executive. But the Board still had the financial responsibility.

All members should be familiar with our annual financial statement which shows that money is never in oversupply in our treasury. And here is where your Board begins to function, quietly but efficiently. These Board members are men and women of some standing in our community who know that the "honor" of serving on the Board carries no compensation but rather the implied obligation to give financial assistance when and if it should be needed. And this, of course, without public acknowledgment. Upon the death of Mr. Marshall the future of your garden was thoroughly discussed and the Board decided on the following course.

The Garden is a living entity and must continue to grow. It should be a tourist attraction as well as an institution of educational and scientific value. To insure additional income, the sale of plants and souvenirs, books, seeds, etc., should be pushed. This has resulted in sales of almost $20,000 this past season. An agreement with Arizona State College has been worked out which gives the college access to our plant material, grants them the right to experimental plantings, and use of our very extensive library in exchange for assistance on botanical problems, the use of their mechanical equipment, access to foundation grants for specific purposes, etc., without either organization making any cash outlays or interfering with each others autonomy.

This saves the garden the expense of a trained botanist and leaves funds for expansion.

A master plan submitted by Mr. Mahoney, one of Phoenix' leading architects, has been approved. Mr. Mahoney has been a member of the board for some time and all buildings have been designed by him. This plan covers 170 acres and will take years in time and effort and much money to bring to completion. But it will be done.

Mr. Eversole, our Chairman, is an attorney, so is Mr. Eliot. They have done an excellent job of getting the Garden on a more solid footing by negotiating with State, City of Phoenix and various agencies for a long term lease for our enterprise. Up to now we have been on a year to year basis.

Today we are solid. Mrs. Lou Ella Archer is the new president. She has been very active in the business affairs of the garden and her financial assistance has been very generous. Mr. Hinman and Mr. Manning have been very active on publicity and their efforts with the tourists are reflected in our substantially increased attendance. This in turn is reflected in our sales, new memberships and contributions. Mrs. Bool as our secretary has been practically irreplaceable. Mr. Rhuart represents the Valley National Bank and handles the Webster Trust, a large source of income.

Tape recorder, photographic equipment, Herbarium cases, new fences, buildings, plantings, warehouse, carport, etc., are evidence of what your Board does anonymously. I cannot mention all of the members but each and every one has done his or her full share.

As to myself I am the yougest member in terms of service and my specialty is that of a gadfly who keeps the pot boiling.

To those who have wondered about who, what and why we are, I can give the assurance that the Garden's affairs are in excellent hands.

—C. E. Mieg.

NOMENCLATURE OF THE SAGUARO

Carnegiae gigantea (Engelmann) Britton & Rose, Journal. N. Y. Botanical Garden. 9:188. 1908.

Syn: - Cereus giganteus Engelmann in Emory, Military Reconnaissance. 159. 1848.

Pilocereus engelmannii Lemaire, Illustrated Horticulture 9: Misc. 97. 1862.

Pilocereus giganteus Rumpler, Hand. Cact. ed 2.662. 1885.

Type locality: Along the Gila River, Arizona.

Distribution, Arizona, southeastern California and Sonora, Mexico.

The Saguaro was not described until 1848 but had been known by the early Spaniards and missionaries from about 1540. The first Anglo-Saxon observation was made by J. O. Patte, 1825, according to research by MacDougal. Engelmann described it in Emory's Military Reconnaissance in 1848.

Britton & Rose, Journal, N. Y. Botanical Garden 9:188. 1908 created the genus Carnegiea in honor of Andrew Carnegie (1835-1919) who was a famous philanthropist and a patron of science and used the taxa Carnegiea gigantea for Cereus giganteus (Engelmann).

Flowering Plants & Ferns of Arizona - Kearney & Peebles, p. 595, 1942, referred to the Saguaro as Cereus giganteus Engelmann yet in their Arizona Flora, p. 569, 1951 change to Carnegiea gigantea (Engelmann) Britton & Rose.

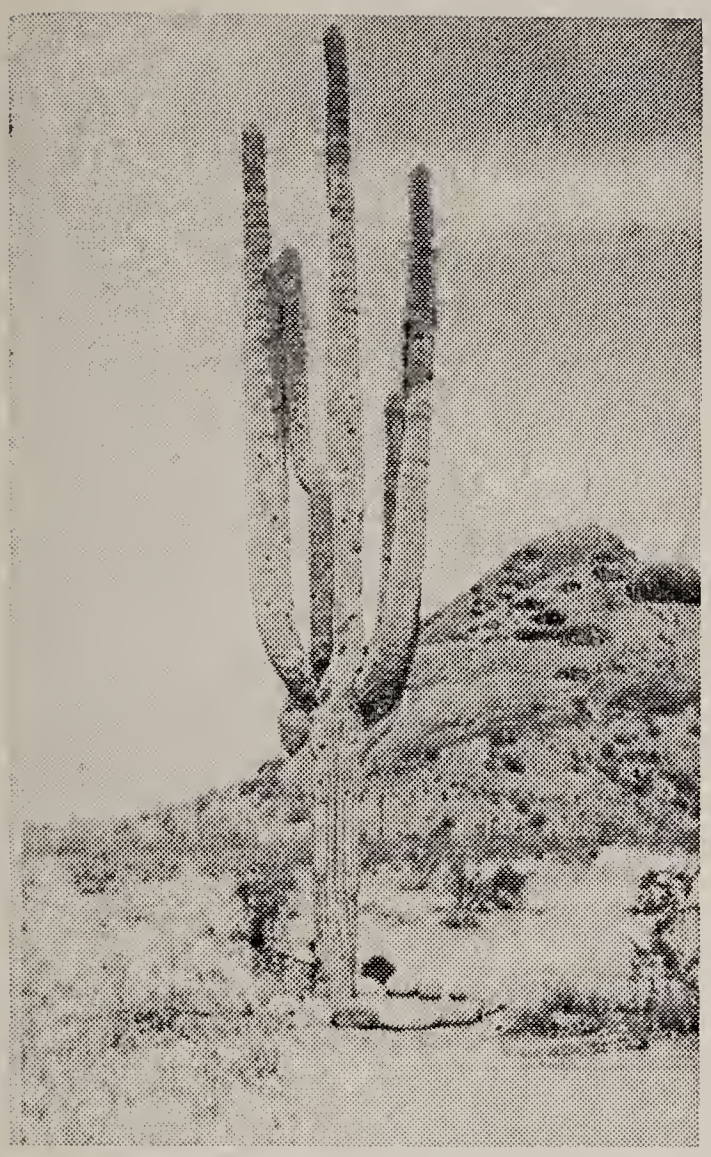
Arizona Cacti - Stockwell & Breazeal, p. 83, 1933 refer to the genus Carnegiea with Cereus gigantea (Engelmann) but in their key, p. 38, show the Saguaro as Carnegiea gigantea.

Cacti of Arizona - Benson, p. 72, 1950, refers to Saguaro as Cereus giganteus.

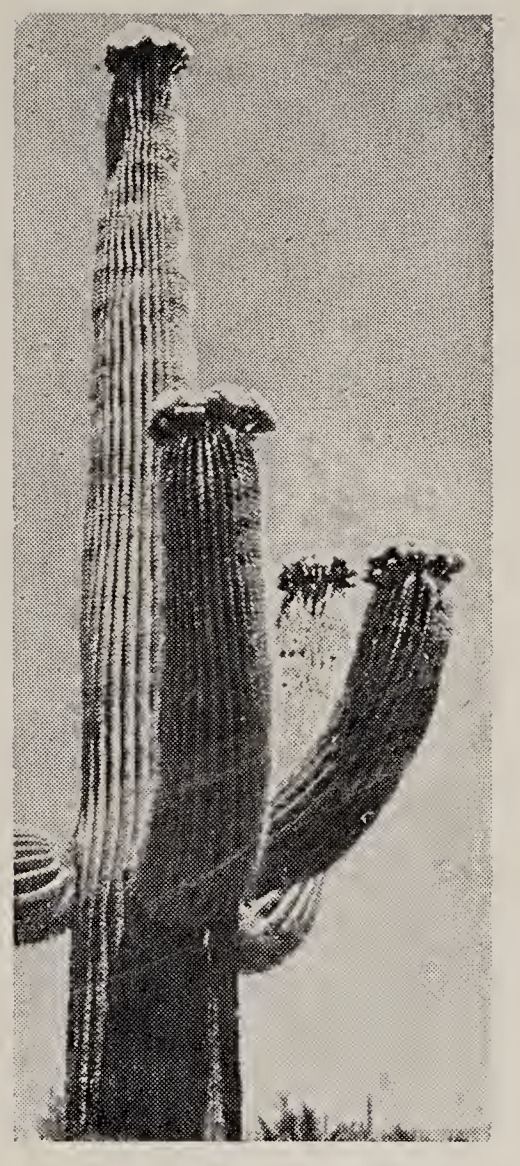
Arizona Cactuses - Marshall, p. 56, 1959, hold to the Britton & Rose classification of Carnegiea gigantea.

Curt Backeberg. - Cactus & Succulent Journal of America, p. 154, 1950, has set up a genus Carnegiea with two sub-genus: 1. Eucarnegiea, Type: Cereus giganteus (Engelmann 1848). 2. Rooksbya, Type: Cereus euphorbioides (Haworth 1819).

All systems of classifications are strictly artificial and will continue for years to come to confuse or to clarify the plants. Those who wish to group genera and species together are called



Carnegiae gigantea
(Engelmann)



Saguaro in Flower
R. C. Proctor photo

'lumpers' whereas those who continually divide and redivide genera and species are referred to as 'splitters.' The latter group is quite essential to the botanists but very hard and confusing to the average layman.

The International Code of Botanical Nomenclature strictly defines changes allowable as: - Third Principle - "The naming of taxonomic groups is based on priority of publication." Fourth Principle - "Each taxonomic group can bear only one correct name, the earliest that is in accordance with the Rules, except in specified cases."

By the above principles, Cereus giganteus Engelmann appears to bear precedence. Yet, the specific name giganteus is used in South America for several large cacti—for example Cereus giganteus is a Trichocereus pachanoi. Thus this proves very confusing to the layman.

Carnegiea gigantea is a monotype and has been accepted the world over for the past 50 years and as such should be retained. It is strange that some of our authors should wish to lump Carnegiea with Cereus when they do not hesitate to divide other Cereanae into different species due to minor differences.

Read at Symposium on Arizona Cacti — Arizona Academy of Science, Phoenix College, April 12, 1958.

WOMAN IN A WILDERNESS

Rose Collom and her husband, 'Bert' Collom, threaded their way up Rye Creek to Silver Butte in the Mazatzal Mts. 44 years ago expecting to remain about three months while her husband did some exploratory work in a mine that later became the Silver Butte Mine. Although they were six miles from a highway, seven miles from Rye, Ariz., on the Roosevelt-Payson Road, (their closest neighbors), and 90 miles from a railroad, the 'three months' extended into 42 years of solitude in a heaven of green wealth for Mrs. Collom.

While her husband worked the mine, she would take long hikes up the side of the Matazal Mts. to about 7000 feet gathering plants, seeds and cuttings, then bringing them down to their cabin and reestablishing them at 4000 feet. After they had become acclimated there for several years, they would then be uprooted and sent down to Phoenix, Tucson, or to other parts of the country to be replanted. This progressive adaption had the approval of many scientists in the country and she contributed material to many Botanical gardens.

She was a keen observer and collector and at one time had collected over 660 plants that were identified at the U. S. National Herbarium.

Mrs. Collom was one of those rare persons in that she became a self-taught botanist. At first she did not know the names of the numerous plants she was discovering, so she sent away for botany books, corresponded with botanists and learned the names of the plants. One of her most ardent correspondents was Dr. J. N. Rose, who in 1936 honored Mrs. Collum by describing one of her discoveries as Echeveria collumae in Desert Plant Life 6; 68. 1934. She also contributed data to Dr. Rose and located many cacti of Arizona which helped him complete 4 volumes of "The Cactaceae," Britton & Rose, 1922.

Another of her discoveries was named Galium collumae by J. T. Howell, and in 1942 Dr. Lymon Benson in Bulletin of Torrey Botanical Club, April 1942, named her latest as Ranunculus collomae.

She encourged the ranchers of Gila County to grow peaches, pears, and apples up along the mountain sides where the coddling moths had not made a stand. The result was that in a few years she and some of her neighbors exhibited fruits from the Tonto Creek Basin country at the Arizona State Fair and walked off with many awards and sweepstakes.

When the Garden reopened in December 1946 she was one of the first to take out a membership and due to her many contributions to the Garden of plant material she was presented an Honorary Life membership. She contributed many articles and her keen powers of observation and deduction were very helpful to scientists and laymen. She visited the Garden frequently bringing with her plants to be identified or bringing us seeds.

In 1955 she requested that Jim Blakley and John Weber, staff members, come up to her cabin and help themselves to all of her herbarium sheets. They went up a very rough trail and brought back with them about 2,000 sheets. Many of them have since been placed in our Douglas Herbarium and duplicates were given to the Arizona State College at Tempe.

In December of 1956 we were shocked to hear of her death while she visited a sister in Edison, Georgia. Later we heard from her nephew that she had willed to the Garden all her books and papers. In March of 1958 we were allowed to accept all of her books and papers and we plan on setting them

apart in a separate section of our library. There are 80 books and more than 260 botanical pamphlets. We are ever so grateful that she thought well of the Garden and allowed us the future use of her many books and papers. She may have been a woman in a wilderness but she did not allow it to bury her, but instead she brought out of the wilderness many unknown plants of beauty for the world to see and enjoy.

AJO
ONION FAMILY

Allium
Liliaceae

One of the old Spanish proverbs, suspirar por los ajos y cebollas de Egypto — "to sigh for the garlic and onions of Egypt", i.e. to desire to return to the wicked life that has passed — may have some connection with the fact that garlic formed part of the food of the Israelites in Egypt, and of the laborers who built the great pyramids of Cheops.

Garlic is described by John Minsheu, who published at London, in 1627, "The Guide Into the Tongues": "It is of most especial use among sea-faring men, and a most excellent savour of the pumpe and stinke in a ship, and of tainted and corrupt meats, which Mariners are faine to eat for fault of better . . . The Spaniards therefore, as it seems, having colder stomachs than other countries, doth well brooke the smell hereof, when everie day before he goeth out of his Inne, as he journieth, he causes garlicke to be stamped, crums of bread and oil to be fried together in the manner of a hastie pudding, and so eateth thereof: the commonsort doe live by it, so that it is the poor mans Physicke and Food."

And another saying reflects this belief: ajo puro y vino crudo, passan el querto seguro, "pure garlic and wine help one to traverse safely the high mountain passes". In Spain, such passes were called dry spots, and wine and garlic were a good defense for travelers.

The garlic is of old English origin, garleac (gar - meaning spear: leac - leek or lance) is one of its early forms.

Allium palmeri 1/3x

Since its introduction by the Spanish, it has had many different uses in the Santa Fe and the Southwest.

When a horse is Malo (suffering from a swollen neck), garlic is crushed with the twigs of Sabrino macho (mule pine), and hot water is added. This is allowed to cool and is then administered.

As a preventative against diphtheria, garlic is strung on a string and worn around the neck by people who are in contact with the disease.

An informant in Galisteo, New Mexico told me she knew of a remedy that gave immediate relief for pain in the bowels on the left side. Two garlic buttons are baked soft, then crushed; a little cold water is added, and the mixture drank.

One crushed button, pressed against the gum, lessens tooth-ache.

When a dog is suspected of having rabies, garlic should be mixed with its food immediately. This also serves as a vermifuge and is a very common ministration in New Mexico and the Southwest.

Besides numerous dishes that are flavored with garlic, it is also believed that it counteracts stomach trouble and flatulency. It is roasted whole on coals, cleaned, thoroughly chewed, and swallowed with cold water. The gas then disappears, and other discomforts are alleviated.

Moreover, garlic is used in one of the many treatments for snakebite. A fresh poultice, made from the mashed plant, should be applied thrice daily. Even as far afield as North Africa, the same remedy is given for hornet and scorpion stings, and garlic is eaten there with honey and rancid butter for the kidneys and bladder.

It is not surprising that, in rural areas, charms should play so important a part in the lives of the inhabitants. So when a young girl wishes to rid herself of an undesirable suitor, she must choose a spot where two roads "make a cross" and there on the ground, she must place two crossed pins and a piece of garlic. When this has been done, the girl must then find some means of making the despised young man walk over the charm, quite unaware of its presence. If she be successful she will be freed from his attentions ever after, so the old people say.

Not long ago, I received the following letter, with its amusing Spanish from a Santa Clara Indian, testifying to the curative properties of garlic for earache: "I was over there and asked the woman about a remedy for my ear, and she says garlic and salt placed on lamb's wool and put in the ear. We are all well and hope you are likewise."

Allium gooddingii 1/4x

Ethnobotanical article about garlic from 'Healing Herbs of the Upper Rio Grande' — L.S.M. Curtin, Laboratory of Anthropology, Santa Fe, N. M.

Ajo, Arizona received its name in 1854 by Emory as wild garlic grows all over the hills in good seasons. The Ajo mountains adjacent to the town, form the southwest boundary of the Papago Indian Reservation.

THE BREATH OF LIFE

By DR. LOUIS E. BLANCHARD
Crystal Beach, Ontario, Canada

Reprinted from the Journal of the Cactus and Succulent Society of America, Vol. XXVI, No. 2. March-April, 1954.

In answer to the Journal's query concerning the similarities of chlorophyll and the blood pigments of man and mollusks, I will attempt to explain briefly their distinctive qualities.

Chlorophyll is a green complex organic pigment in the chloroplasts of plant cells. It is composed of two similar proteins, known as chlorophyll and chlorophyll b. This complex molecule contains many atoms of carbon, hydrogen, oxygen and nitrogen, built around a hub of magnesium. Although iron is essential for its production, it does not enter into its composition.

The red hemoglobin molecule of human blood is formed by the union of two highly complex proteins known as globin and hematin. The formula for this pigment is similar to that for cholophyll, but with iron (Fe) substituted for magnesium (Mg).

In the invertebrates, such as oysters and lobsters, the blood pigment, hemocyanin, is blue. This is due to the copper (Cu) which replaces the iron (Fe) of hemoglobin.

These compounds (chorophyll, hemoglobin and hemocyanin) are chromoproteins with specific pigments. For example, hemoglobin is an iron complex joined to the protein molecule.

The blood pigments (hemoglobin and hemocyanin) have respiratory functions and are characterized by their ability to combine easily with loosely-held oxygen. By means of these pigments, the capacity of the blood to carry oxygen is multiplied about seventy times.

Chlorophyll has an entirely different function, even though it structurally resembles the respiratory pigments. It is wholly confined to green plants where it is active only in the living condition. It is unique in its synthetic ability to combine carbon dioxide from the air and water from the soil to produce carbohydrates (sugars) and liberate oxygen. This process of photosythesis takes place through the ability of chlorophyll — containing cells to utilize the radiant energy of sunlight. This is a reaction whereby low-energy inorganic compounds are transformed to highly potent organic products (sugars). It operates most efficiently in leaves, but in arid regions, the green stems of succulent and xerophytic plants perform this task. As chlorophyll functions without being consumed, it is regarded as an organic catalyst or enzyme.

Carbohydrates are utilized by the plant to obtain energy through respiration (oxidation) and to synthesize other substances, such as proteins and fats by its combination with absorbed inorganic salts. These products are rendered soluble by digestion and in such conditions are available for incorporation into living protoplasm. The mechanism of assimilation whereby inanimate materials cross the bridge of life, to become integrated into living structures, remains Nature's greatest unsolved mystery.

Chlorophyll has a monopoly of the manufacture of food. It bestows upon green plants the power of complete independency, and is directly or indirectly essential to all other forms of life. All the foods in animal nutrition, including man, are modifications of the sugar produced by photosynthesis. Food materials such as meat, milk, and eggs are obviously indirectly derived from plants.

Chlorophyll is the connecting link between the animate and the inanimate world: it alone has the power to breathe the breath of life into the dust of the earth.

SPRING CLASS ON DESERT FIELD TRIP

Front row — Mariebel Pratt, Phoenix; Helen Friedricks, Golden, Colo.; Isabelle Holt, Phoenix; Mildred Schafer, Howell, Mich. Kneeling — H. W. Price, Michigan. Standing — Otto Friedricks, Golden, Colo.; Mrs. A. Howland, East Lansing, Mich.; Mrs. Faith Carl, Phoenix; Mr. Arthur Howland, East Lansing, Mich.; Mrs. G. Kirkendall, Grosse Point, Mich.; Hiram Pratt, Phoenix; Geo. Kirkendall, Sally Feese, Phoenix; Mrs. H. W. Price, Michigan.

Unexpected visitor dropping in to offer us aid, if needed.

SAGUARO LAND BULLETIN

DESERT BOTANICAL GARDEN of ARIZONA

JUNE-JULY, 1958

Epithelantha micromeris
Collected 30 miles west of Saltillo, Mexico. (See p. 69).

REG MANNING

SAGUAROLAND BULLETIN

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W. HUBERT EARLE, Editor

Volume 12 JUNE-JULY, 1958 No. 6

Arizona Cactus and Native Flora Society

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Chairman of the Advisory Board — Leslie J. Mahoney

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Desert Botanical Garden of Arizona

STAFF

Director ..... W. Hubert Earle
Consulting Botanist ..... James A. McCleary, Ph. D.
Horticulturist ..... John H. Weber
Assistant Horticulturist ..... A. R. Magness
Summer Student ..... Demetrios Vlachos
Summer Student ..... Roy Vail

Garden Open Only On Saturday and Sunday During June, 9 A.M. to 5 P.M.
Closed During July for Summer Building Program.

PROGRESS IN THE GARDEN

During June, the Garden is open to the public only on the week-ends and that is the signal for the beginning of our heavy construction program.

The Garden Committee recommended to the Board, last May, that a new parking lot be constructed this summer as the smaller lots were inadequate for the large crowds now attending the Garden during the winter months. This lot has been started and will be completed in August. The lot will have a capacity of approximately 160 cars (the old parking lots held only about 28 cars). About 100 Agaves, Century plants, have been planted outside of the lot which is bordered with large black 'bumping' boulders. The lot is now surfaced with a fine granite and will in the future be black-topped.

Four large beds have been constructed on the old parking lots. A bed is being planted with Arizona plants and will be a living memorial to our late director W. Taylor Marshall. The other beds will be planted with Mexican and South American plants.

Over 100 tons of black boulders and 80 yards of decomposed granite have been donated for these beds by Chas. Mieg of the Garden Committee who also labored and supervised, during the hot summer days, the construction of the beds and plantings.

Two truckloads of barrels, ocotillos and Yuccas have been planted in the beds with the memorial contribution of Mr. and Mrs. Richard Goldman, Mt. Kisco, N. Y.

We urge all members, who have extra plants, to donate them to the Garden as they can be planted in these new beds.

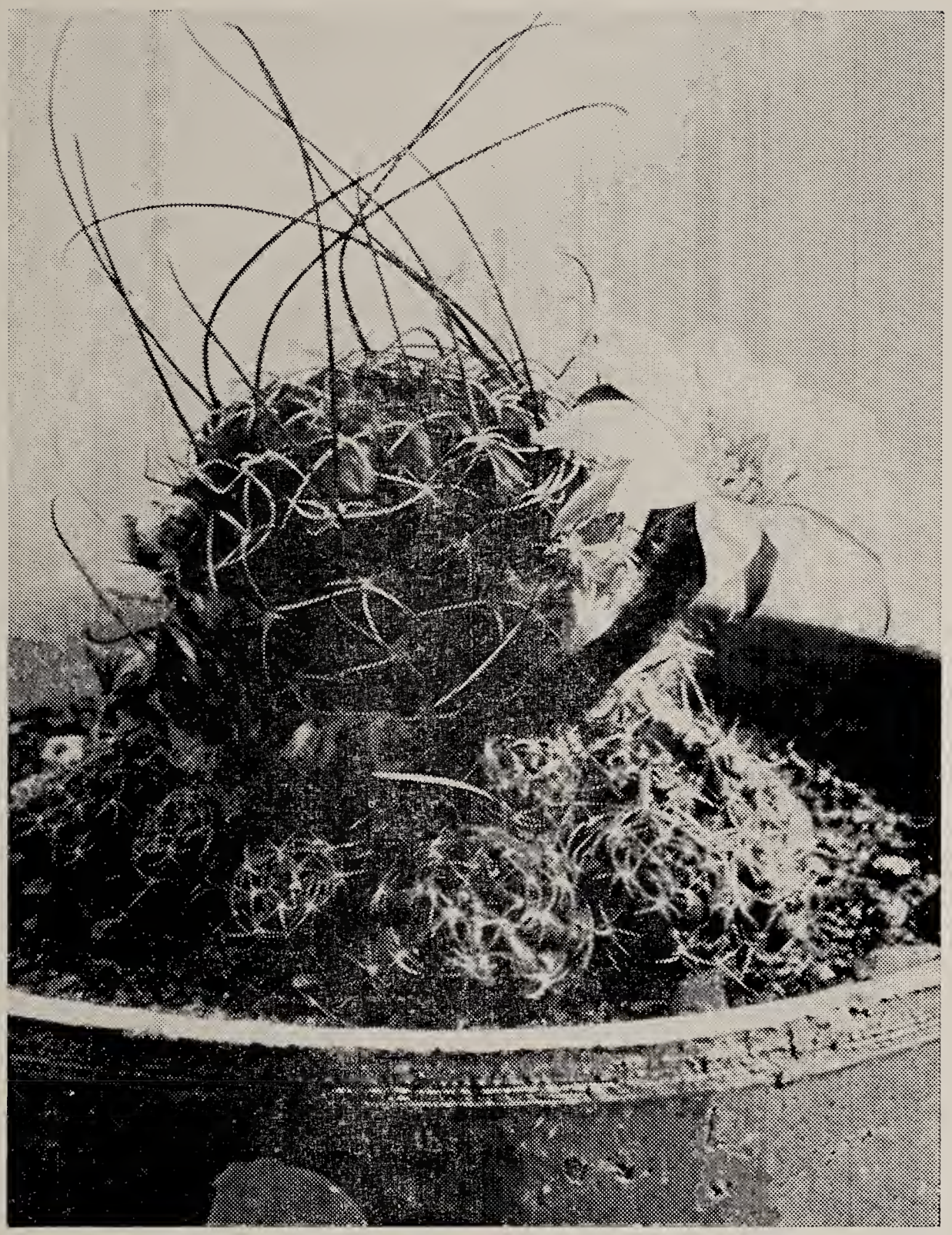
Beds under construction on old parking lot. Marshall memorial bed surrounds Saguaro, rear left.

New bridge, with temporary railings, that leads from new parking lot into Garden.

New beds just completed, ready for planting.

LOBIVIA WRIGHTIANA

Text and Photo by LEX FUAUX



Lobivia wrightiana. Backbg. Photo by Lex Fuaux.

Towards the end of 1937, Backeberg described in his **"Blatter fur Kakteen-forschung"** (1937-12) a new Cactus from the Montaro Valley of Central Peru, calling it the **Lobivia wrightiana.** This little plant is one of the most attractive of the Lobivia's, a collected specimen of which is well illustrated (ibid.). But since that time it doesn't seem to have attracted the attention of fanciers to the extent warranted by its very dense spination, dainty mauve flowers, and ease of growing. Its very long and stout tap-roots prefer a light and readily penetrated soil; it is quite hardy outdoors, tolerating extremes of heat and cold without affect. The plant illustrated is a young one, showing only its primary spination, but the description below is drawn up from plants ob-

tained from Harry Blossfeld in 1937, and grown here at the Herbarium.

The species may be described thus: Plants densely caespitose, individual heads 5 - 7 cm. high and wide, glossy dark green. Ribs 13 - 18, low and rounded, when straight, with a marked V above the areoles; when spiralled, with obliquely set low tubercles. Radial spines about 10, acicular to stout acicular, 5 mm. - 8 c.m. long, when short, pectinate and appressed, when long, tortuose and semi-appressed. Central spines 2, to 10 cm. long, very stout acicular, twisted and tortuose, golden brown in youth, later ashen. Flowers small, about 6 cm. long, hidden under the spines, with a slim tube bearing some white hairs. Tepals elliptic - acuminate, muave to violet, lasting two-three days. Fruit small, a pink to dark red berry.

Late in 1956, Backeberg published a varietal form, **var. brevispina,** Bckbg. in his **Descriptiones Cactacearum Novarum.** (P. 30), which he describes as having "rose" flowers, short (radial?) spines, and lacking a long central spine. In 1950 he informed us (priv. corr.) that "I do not think that a variety of **L. wrightiana** is justified, because I know that they are growing with all kinds of spines at the same place, and must have been cross-pollinated in nature."

THE DESERT BOTANICAL GARDEN OF ARIZONA

Is sponsored by the Arizona Cactus and Native Flora Society, Inc., a non-profit educational institution incorporated in 1938 and is located on government leased land in Papago Park between Phoenix and Tempe. It was formed by Mrs. Gertrude Devine Webster and Gustavius Stark, both of Scottsdale, Ariz. It is administered by a Board of Directors and an Advisory Board. For the first few years of its operation it was mostly a club for its members and was not open to the public.

During World War II it was closed from 1942 to 1946 as the Garden was within a military district and very little was done tc preserve the plants or the area.

The Garden was reopened in December, 1946, by the late Director Wm. Taylor Marshall who built it up to its present world-wide acceptance.

The purpose of the Garden has been to propagate, classify, experiment and publish results of all types of desert plants. To conduct classes, lectures for all interested persons and groups and expeditions for the discovery of new plants and extensions of plant range.

The Garden has a physical plant of the following: Webster Auditorium, 2 apartments, herbarium, book store, 8000' aluminum lath-house, greenhouse, warehouse, director's dwelling, large rest rooms and several ramadas. Replacement value for these buildings would be approximately $110,000. Improvements of paths, fencing, road beds, etc., another $40,000. Plants, on many of which no value could be set, about $90,0000.

The Library is quite outstanding and is considered by many as the most comprehensive collection of books pertaining to succulent plants. A large portion of the present library was willed to the Garden by the late director, Wm. Taylor Marshall. Many rare books have been acquired from foreign countries and numerous books donated to the Garden by interested members.

The Staff consists of a Director, Horticulturist, two assistant Horticulturists and a Consulting Botanist. Much of the work of the Garden has been donated

by members who have volunteered their time doing sales, traffic, guide and office work.

The Garden is maintained by endowments, memberships, contributions and its sales at the Book Store. Memberships now total 475. 60% are from Arizona, 30% are from the U. S. A. and 10% from foreign countries.

The Garden is open to the public daily from 9-5 during the months September to June and is closed from July 1st to August 31st, but is always open to its members, botanists and schools. Attendance is from 110,000 to 125,000 yearly with visitors attending from all over the world. No admission charge is made.

In the past 10 years over 5,000 accessions of plants, mostly cactus and succulents, have been recorded at the Garden. There are now more than 11,000 plants of over 2,500 different species for study.

Grade Schools, High Schools and College classes use the Garden's facilities daily throughout the year. High School and College groups are given a short lecture with Kodachromes of desert plants before making their tours of the Garden. Girl and Boy Scouts, Camp Fire Girls, etc., usually make their tours on Saturdays. A member of the Staff usually accompanies all of the above groups, explaining, if necessary, the plants.

Courses of instruction are held in 'The Growing and Identification of Desert Plants' in the fall, winter and spring. Each course consisting of 6 classes each ending with an all-day Field trip into the desert. Classes in Morphology and Taxonomy of Cacti are held each Tuesday night also at the Garden.

A series of 12 different lectures, with the use of Kodachromes, is given concurrently on Thursday afternoons throughout the tourist season. Lectures are also given at Hotels, Conventions, Garden Clubs and Civic Groups throughout the State. Demonstrations of plant horticulture and educational exhibits are also made at many Garden Shows.

One of the high spots of our winter season is an Annual Cactus Show, cosponsored by the Phoenix - Gazette, which attracts over 11,000 visitors in a week. Eleven such shows have been staged for the past 11 years.

All of the above activities are given to its members and to the public with no charge being made.

The Garden has published many books and two are in the formative stage. 'Arizona Cactuses' will be reprinted this fall. 8,750 copies have been sold since 1951. 'Introduction to Desert Plants' was printed in 1955 with 2,200 copies. Our 'Self-conducted Nature Walk,' used on a tour of the Garden, has reached 65,000 sales and 15,000 additional copies will be printed this fall for the winter season.

In the past year the Garden has furnished articles to three American plant Journals and eleven foreign magazines and has made several reviews of foreign books all relating to Cactus and Succulents. Several stories have been supplied to popular American magazines during the year.

For the past few summers, the Garden has had a college student working during the summer months. The last two years the students were from foreign countries. This year a student from Earlham College, Richmond, Ind., will be working with us. Next year we hope to begin an exchange program with the personnel of the University of Mexico. Several years later we will work out an exchange basis with Universities or Colleges in other countries. Work will consist of working and studying the desert flora of the various countries.

Read at Symposium on Arizona Cactus
ARIZONA ACADEMY OF SCIENCE
Phoenix College, April 12, 1958

COLLECTING CACTI IN MEXICO

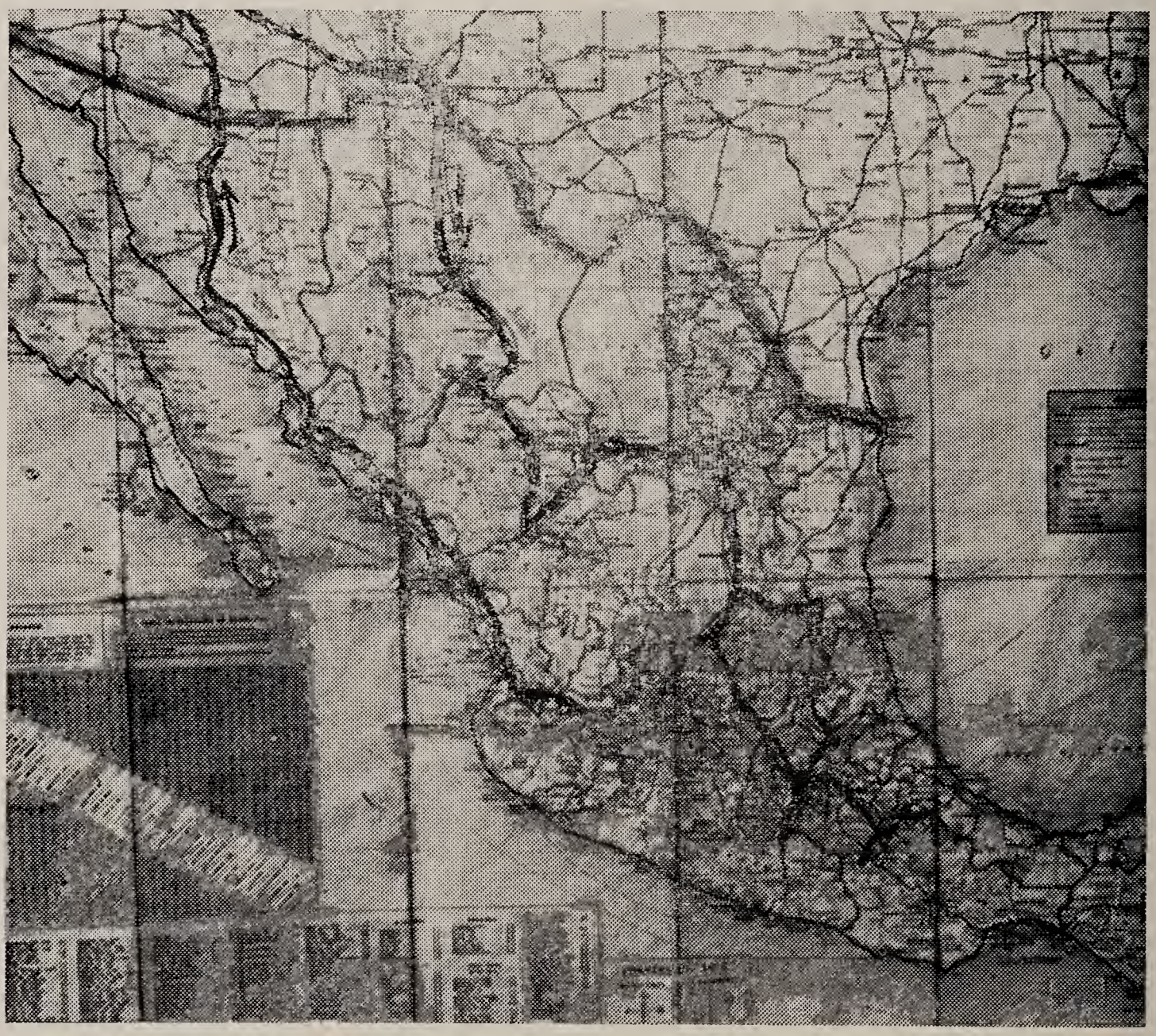
Andre Cuenoud and your Editor had the rare opportunity of accepting the invitation of Charles Mieg to accompany him on a trip into Mexico from June 22nd to July 8th to collect cactus plants from their type localities, seeds of cactus, desert trees, shrubs and perennials.

Traveling with Charles is a treat for any cactus collector. Having previously made seven trips through Mexico, he has become a cactus 'bird-dog' of no mean stature. Ask him where a certain plant grows, he will not only tell you where, but will show you its location within a few hundred feet. This saves days of wasteful hours looking over barren areas. Many of the Mexican cactus enthusiasts, who hold him in high esteem, call on him continuously for locations of plants that they cannot locate.

The map, shown below, indicates our route of 4,975 miles thru the states of Chihuahua, Durango, San Luis Potosi, Puebla, Coahuila, Hidalgo, Jalisco, Queretaro, Vera Cruz, Nueva Leon, Sinaloa and Sonora.

Knowing that many of our members are interested in the whereabouts of many of the Mexican plants, the following log should prove useful and give you a fair idea as to their locations.

June 22nd: Phoenix, El Paso, Chihuahua, 613 miles. Began to collect following plants just north of Chihuahua



Map of Mexico showing route, in heavy line, of trip.

Cephalocereus macrocephalus growing over hillside 23 miles SW Tehuacan, Mex.

City — Echinocactus parryi, Echinomastos intertextus, Echinocereus pectinatus var. dasyacanthus and Agave parryi var.

June 23rd: Chihuahua City, Hidalgo del Parral, Durango — 428 miles. Echinocereus stramineus in flower and fruit, Cory echinus, C. macromeris, C. muehlenpfordtii, C. cornifera, Mammillaria lasiacantha, M. gummifera, Thelocactus uncinatus, T. pottsii, Opuntia vivipara, Echinocereus palmeri, E. setispinus, E. pectinatus, Echinocactus horizonthalonius. Euphorbia antisyphilitica.

June 24th: Durango, Torreon, Saltillo —354 miles. Coryphantha vaupelianus, C. clava, C. radians. Mammillaria gummifera, M. lasiacantha, M. pottsii, M. chinocephala, Echinomastus unguispinus, E. mapimiensis, Escobaria tuberculosa, Echinocereus enneacanthus, Astrophytum myriostigma, A. capricorne, Thelocactus hexaedrophorus, T. bicolor, T. bicolor var. schmollii, Epithelantha micromeris, E. micromeris var. rufida, Grusonia bradtiana, Ariocarpus retusus, Neolloydia conoidea. Manfreda sp., Leucophyllum texanum, Thamnosa sp., Agave lechuguilla, Yuc-

Cephalocereus hoppenstedtii — 25 miles SW Tehuacan, Puebla, Mex.

ca australis, Y. carnerosana.

June 25th: Saltillo, Matehuala, San Luis Potosi — 279 miles. Ferocactus pringlei, Opuntia stenopetala, Echinocereus blankii, E. pentalophus, Neolloydia beguinii, Thelocactus fossulatus, Echinocactus ingens, Echinofossulocactus coptonogonus, E. papyracanthus, Turbinocarpus schwarzii, Myrtillocactus geometrizans, Mammillaria candida.

June 26th: San Luis Potosi, Queretaro, Mexico City — 242 miles. Spent morning at Fritz Schwarz Cactus Garden. Later in day collected Coryphantha clava, Mammillaria magnimamma, Ferocactus latispinus.

June 27th: Mexico City, Puebla, Tehuacan, Orizaba, Fortin de las Flores and back to Tehuacan — 309 miles. Solisia pectinata, Mammillaria elegans, M. compressa, M. mystax, M. pseudoperbella. Ferocactus robustus, F. recurvus, F. flavovirens, Coryphantha asterias, C. pectinata, Lemaireocereus stellatus, L. chichipe, L. pruinosus, Cephalocereus chrysacanthus. Beaucarnea gracilis.

June 28th: Tehuacan, Zapotitlan Salinas, Tehuancan — 70 miles. Lemaireocereus hollianus, L. dumortieri, Echinocactus ingens, Ferocactus recurvus, Cephalocereus hoppenstedtii, C. macro-

sephalus, C. ruficeps, Mammillaria viviparina, 30 miles southwest of Tehuancan we finally found small Beaucarnea gracilis, and one specimen plant weighing about 100 pounds which was one of the objectives of the trip. After much effort seeds were carefully gathered to be proprogated at the Garden. The plant pictured on this page is 15' high and 4'-6" at its base and is several hundreds of years old.

June 29th: Tehuacan, Puebla, Amecameca, Yautepe, Cuernavaca, Mexico City — 310 miles. Spent part of day gathering seeds of Delonia regia (Flame tree) at Hacienda Vista Hermosa and later collected seeds of Caesalpinia pulcherima (flor del Camaron). These seeds will be proprogated at the Garden and plants later released to the trade.

June 30: Mexico City. Spent greater portion of day cleaning and packing our plants. Visited with Dr. Helio Bravo at the Del Instituto de Biologia and that evening we joined her and Mr. and Mrs. Dudley Gold for dinner at the Suiz Chalet.

July 1: Mexico City, Pachuca, Ciudad de Valles — 291 miles. Mammillaria sempervivi, M. elongata, M. compressa,

Beaucarnea gracilis — 30 miles SW Tehuacan, Mex. A limited seed supply from this plant is available at 50c per package for handling.

Echinocereus ehrenbergii, Selenicereus spinulosus.

July 2: Ciudad de Valles, Ciudad Monte, Ciudad del Maiz, Santo Domingo, San Luis Potosi — 233 miles. Buecarnea recurvata, Pilocereus palmeri, Hylocereus undatus, Rhipsalis cassutha, Echinocereus pentalophus, E. enneacanthus, E. pectinatus, Mammillaria candida, M. magnimamma, M. formosa, Leuchtenbergia principis, Astrophytum myriostigma, Thelocactus buekii, T. uncinatus, Lophophora williamsii. Mallow sp., a perennial with brilliant red blossoms.

July 3rd: San Luis Potosi, Aguascalientes — 100 miles. Echinocereus pectinatus, Coryphantha asterias, Echinofossulocactus coptonogonus, Echinocactus horizonthalonius, Ferocactus latispinus, F. stanesii, Mammillaria erectohamata, Neolloydia clavata.

July 4th: Aguascalientes, Guadalajara, Tepic — 373 miles. Pachycereus grandis, Acanthocereus pentagonus, Hylocereus undatus.

July 5th: Tepic, Mazatlan, Los Mochis —446 miles. Pachycereus pectin-aboriginum, Wilcoxia mariana, Rathbunia kerberi, R. alamosensis, Lophocereus schottii.

July 6: Los Mochis, San Blaz, Los Mochis — 90 miles. Collected fruit off Lemaireocereus thurberi and Pachycereus pectin-aboriginum with the help of Hernando Mejorada, an ardent cactus collector and member of the Sociedad Mexicana de Cactologia.

July 7: Los Mochis, Guaymas, Hermosillo, Nogales, Ariz.

July 8: Nogales-Phoenix. Back home with over 600 plants and 80 of these came to the Garden from type localities.

Part of Garden's summer staff — l. to r. Demetrios Vlachos, Arizona State College, Tempe and Velvendos Kozani, Greece. John Weber, Horticulturist, Phoenix. Roy Vail, Earlham College, Richmond, Ind.

SAGUARO LAND BULLETIN

DESERT BOTANICAL GARDEN of ARIZONA

AUGUST-SEPTEMBER, 1958

Kachina Dolls made by
the Hopi Indians.
(See p. 77)

REG MANNING

SAGUAROLAND BULLETIN

Published and owned by the Arizona Cactus and Native Flora Society, sponsors of the Desert Botanical Garden of Arizona, P.O. Box 547, Tempe. Saguaroland Bulletin attempts to promote the Garden and to provide information on the desert plants and their culture. Subscription $3.00 per year, the subscription including active membership in the Society and the Desert Botanical Garden. Issued 10 times a year.

W. HUBERT EARLE, Editor

Volume 12 AUGUST-SEPTEMBER, 1958 No. 7

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Summer Student ..... Roy Vail

Garden closed during August for Summer Building program.
Garden open only on Saturday and Sunday during September, 9 A. M. - 5 P. M.
Garden open daily 9 A. M. to 5 P. M. from October 1st to June 1st.

LOBIVIA JAJOIANA

Text and Photo by LEX FUAUX
Rosanna, Victoria, Australia

Lobivia jajoiana. Backbg.

Lobivia jajoiana Backbg., is another of the very hardy Lobivia's that may be grown out of doors with the greatest of ease. Coming from an elevation of 3000 metres in the province of Salta, Argentina, it displays a very considerable variety of forms which intergrade with one another in such a way that the characters set up by Backeberg to distinguish the variety **fleischerianum**, Backbg., may be found in varying degree amongst all of them. We therefore do not accept this taxon as being based on any relatively permanent segment of the population. The accompanying illustration was made of a young plant in 1950, showing the primary spination of one of one of the shorter spined forms which later become much more densely spined. All of the plants cultivated here stem from the collections of Harry Blossfeld, from which is drawn up the following composite description:

Plants low, grey-green, sparingly caespitose, individual heads broad and flattened, or narrower and sub-cylindric, 10 - 15 cm. diameter. Ribs 15 - 21,rather sharp; when straight scarcely tubercled, when more or less spiralled, bearing obliquely set tubercles, sometimes with a marked "chin." Spines radial to subcentral, with a single hooked central in all forms, 1 - 10 cm. long, slender, straight or tortuose, bulbous at base, stout acicular, ashen in age. Radials 8 - 14, short below the areole to as long as the central above the areole, where 1 -2 are in a sub-central position. Flowers 6 - 7 cm. long and wide, tubular-campanulate, with very heavy dark hairs and wool on the tube; tepals sphathulate - pandurate, margins entire-apiculate to lacerate, pale tomato red to darker red with a faint bluish tinge. Throat deep reddish-black, stamens crimson above, anthers yellow. Fruit varying in size, hairy, round, red.

ALAMO DE HOJA REDONDA

Valley Cottonwood — Populus wislizeni
Willow Family — Salicaceae

How grateful the conquistadores must have been for the large cottonwoods which gave them shelter on their journeys and guided them to water, later providing shade in their plazas and along their alamedas!

Americans now prefer to plant only the male of the speceis as the female trees litter their surroundings with conton. On the other hand the Spanish and Mexican settlers, especially the children, prized — and still do — the young green pods of the female cottonwood which provide for them an early relief from their winter diet.

Alamo bark, leaves, and branches all had their uses. The former was burned and the ashes mixed with corn meal and water to make a poultice for boils. Even black boils yielded to this treatment, turning white and healing rapidly. The leaves of the tree were boiled in water and the decoction taken to relieve dropsy.

Before modern methods of treating bone fractures were known, a large quantity was simmered for an entire day in a big tub of water, care being taken to keep the fire low. The liquid was strained, returned to the fire, and cooked until it reached the consistency of honey. After a broken bone had been set, this thick syrup was spread over the break, or placed on a cloth and

Populus fremontii. These trees are common to the stream banks in Arizona and reach heights of 50' and have trunks 3'-4' in diameter.

wrapped tightly about the fracture. Additional bandaging was considered unnecessary since the syrup hardened enough to serve as both splint and wrapping. Such was the nature of this remarkable cast that it remained in place about two months, only disintegrating when the bone had had ample time to knit. The use of a little oil faciliated its final removal.

Even now, in Truchas, a similar method of treatment survives; the branches, instead of the bark, are boiled to obtain the syrup. When this has hardened over the fracture, a splint of the curved bark is used as reinforcement.

To the Pueblo Indians, the bole of the large cottonwood is of foremost importance, as it is from this tree-trunk that their drums are fashioned. A selected section is hollowed out by burning and scraping to form the resonant frame for their double-headed instrument. From the light thick root, furthermore, the Hopi Indians of Arizona carve their sacred Katchina dolls.

ALAMO SAUCO

Mountain Cottonwood — Populus angustifolia

Narrow-leafed Cottonwood

This cottonwood, the leaves of which are somewhat similar to those of the graceful willow, also border mountain streams and offers its shade to men and animals.

A medica will advise robbing the ripe fruit, dipping the cotton in water, and ed by steeping the fresh flowers for placing the pad on a swollen gum, believing it will reduce inflammation. And

when some one has an ulcerated tooth, a similar method is employed.

The old-world custom of purifying the blood in the springtime was follow- several hours in cold water. The resultant infusion was then strained and drunk.

Ethnobotanical excerpts from 'Healing Herbs of the Upper Rio Grande' — L. S. M: Curtin, Laboratory of Anthropology, Santa Fe, N. M.

Populus fremontii is the common mesophyte cottonwood we find along the southern Arizona streams or dry rivers. The Pima Indians used its twigs in the making of baskets and relished the catkin-like blossoms. Alamo, 15 miles south of Phoenix, received its name from the large cottonwoods growing along its small stream.

Populus fremontii, Fremont's Cottonwood, found abundantly in dense stands along Arizona streams at 6000' and lower,

BALANCE IN NATURE

By Dr. LOUIS E. BLANCHARD

Crystal Beach, Ontario, Canada

With the dynamic touch of spring, the dormant fields and deserts turn to active life. Wild flowers in a spectacular succession of bloom, present an exquisite colorful pageant that lasts until frost. This lavish dsiplay of sublime beauty in tranquil surroundings, represents one of nature's magical achievements. It is a colossal victory in the miracle of life, and as these dauntless plants have solved the mystery, they cheer us with their glory and fragrance.

Consider the problems of a garden—its success depends on proper nutrition, cultivation, and sanitation; constant vigilance is essential to combat the many adversities. When successful, it represents a victory of which we are justly proud; yet nature accomplishes all this without the aid of cultivation, additional fertilizers, or pesticides. If nature's methods are inviolable, then our efforts are the penalties of transgressions. Here are two methods diametrically opposed; yet each seems to serve its purpose adequately. If nature represents balance, then cultivation would imply imbalance. Let us compare such vital factors as nutritional and immunological problems in these systems.

In nature, organic material is reduced to humus by an intricate, biochemical process. This complex, dark - brown, insoluble material is colloidal in character and is composed of nitrogenous compcunds in the form of ligno-proteinates. Humus has a high water-holding capacity and improves the soil structurally. Its presence also increases the soil's ionic exchange capacity and is a source of nitrogen for plants. It slowly decomposes under favorable conditions of temperature and microbial activity, liberating available nitrogen for plant growth. Its ability to attract nutrients and to hold its nitrogen in an insoluble form until needed, is one of its most valuable properties.

This feature prevents nutrient losses by leaching. It has taken many years to produce sufficient humus for adequate growth, and as it undergoes changes, it is constantly replaced by decomposing organic material from plant residues. The decaying plant tissues also form an organic mat that prevents erosion and excessive oxidation, thereby conserving the soil's energy. By these methods, nature has provided the essentials of adequate yields. Its nutritional levels are conducive to growth with the production of a large amount of seeds or numerous small fruits; such response provides security where reproduction is the prime objective.

The viability of seeds is variable; some are capable of germination at maturity; others require a resting period until the following season. There are records of germination after forty or more years, with an extreme case where lotus seeds buried in peat for about 200 years, were still viable. Generally speaking, germination after 10 years is a rarity; most seeds from plants in cultivation, retain their maximum vitality for the following season. Growers have found it profitable to use fresh seeds. The reports of germination of wheat over 3,000 years old from a sealed Egyptian tomb, must be considered as fantastic.

In cultivation, the tilling of the soil removes the natural mulch of dead organic material and increases the evaporation loss. Oxidation by excessive soil ventilation, reduces the humus faster than it is formed; crop removal does

An isolated Saguaro, Carnegiea gigantea, growing in decomposing granite on mountainside.

not allow adequate return of organic material to the soil. Striving for larger blooms or fruits, also calls for more nutrients. This is a direct reversal of the methods and objectives of nature; so adequate fertilizers must be added to the soil to compensate for the induced deficiencies. Soils under active cultivation require a continuous return of organic material to alleviate these impositions. A virgin soil is well-balanced; it was built by nature during the ages. Heavy continuous cropping with indifference to organic restoration, soon produces an unbalanced and unnatural soil condition.

Wild growth consists of a heterogenous vegetation in a symbiotic relationship. Plants grow in certain localities, because the conditions of climate and soil are favorable for their existence. The flora is extremely variable, and its disposition is far and wide. This is due to the fluctuation in climate, soil chemistry, and water. These factors are significant in their welfare.

Nature's most vigorous weapon in combating disease is isolation. A virus cr fungous infection, which is usually associated with aphids and other pests,

may produce serious or fatal results in a community of plants. However, the spread of such disease in epidemic proportions, would be impossible; the fungous spores or parasites would have to be transported long distances and in adequate mass, to be of serious consequence. In cultivation, the nearest approach to this natural method of space protection is crop rotation. Pests that have developed in one season will thereby starve in the next, on account of lack of food.

Plants bred into new varieties require constant care, because they are placed in a new environment under unnatural conditions. They have been forced into rapid evolutionary changes, and have not had time to adjust themselves against diseases. This necessitates a vigorous program of special treatments for their mere existence. Such plants would indeed by short lived in natural competition.

It is interesting to note by immunological comparison, that Man occupies a similar position in his rapid evolutionary progress. In the Middle Ages, large portions of the world's population frequently perished in short periods of time because of epidemics, such as bubonic plague, cholera, and typhoid fever. Primitive therapies, such as sacrifices, incantations, and charmed potions now only have historic value. Medicine, radiography, surgery, and other sciences have made momentous progress. Improved sanitaiton, the etiological association of pathogenic bacteria with diseases, and the biochemical relations of glandular disturbances have advanced the lines of human progress. Natural immunity essentially lagged, as it required ample time for its production. To maintain this unnatural position, Man has developed immunological factors through biochemical advancement and is thereby able to hold his advanced position. By adequate prophylaxis, with vaccines, sera and antibiotics, endless thousands have been saved. Diphtheria, typhoid fever, malaria and many other diseases have been placed under absolute control. The span of life has been definitely lengthened.

Plants in nature possess well-balanced immunological controls. It is believed by geologists and paleontologists, that early plant life on Earth antedated Man by millions of years. There has been no artifical surge in plant advancement; ample time has permitted a reenforced progress by the production of natural immunity. The parasites of plants have also suffered severe competition in their life struggles. Insects, such as the various beetles, have battled against the ravages of diseases by micro-organisms, and their numbers have been sufficiently reduced to prevent them from becoming a serious menace.

In Japan, the Japanese beetle (Popillia japonica) is not a serious threat. Its destructive activities there are similar to those of some of our native beetles. Their presence there, as with some of our beetles, though noticeable in certain localities is not in epidemic proportion. The natural enemies of pests are the controls that permit a balanced life. The Japanese beetle introduced in America, had a free reign; they could carry on without interference; and their damage has been serious, as nature has not had the time to develop an adequate defense. Such unbalanced reactions are the results of biological surges. Any epidemic, whether in plant or animal life, represents a temporary breakdown of one of nature's defense mechanisms. When balance is established by immune reactions or death of the pests because of lack of food, equilibrimu is again temporarily restored, and life continues in apparent peace.

In the battle of life, the plants' greatest struggles are with the invisible foes. The great power of micro-organisms

lies in their dimunitive size and incredible rate of reproduction. Mutations and natural selections to suit any specific environment, fit well in their evolutionary scheme. Under ideal conditions, they can produce millions of generations in one day. It is logical to assume, that there can be no permanent immunity from the ravages of such adept parasitic life. The number of generations of plant life in a unit of time is insignificant, compared to that of bacteria and viruses. Even if a plant evolved such a natural immunity, it would indeed be only temporary; the parasites by mutations and selections would develop a variety capable of coping with the new situation. As old diseases are naturally conquered, new maladies will develop. This too is evolution; it is evolution for the parasites.

In greenhouses, the red spider mite (Tetranychus telarius) has a tremendous power of reproduction. It has been found that one female can produce about 20 mites in 30 days at 60 degrees F; about 13,000 mites in 30 days at 60 degrees F; and in excess of 13,000,000 mites at 80 degrees F.

Some specific spray compounds of recent development, at first gave perfect protection. With continual use of the same materials, there soon developed strains of mites that were immune.

Here again was an evolutionary victory for the parasites. New therapeutic agents are essential to cope with the ever changing conditions.

Success in perpetuation necessitates the production of seeds stored with highly concentrated foods and the protection by sclerified and resistant shells. Protection during dormancy and harsh climatic conditions is vital to the species. The production of seeds represents the consummation of life for all annual and certain perennial plants. Long-lived perennials, such as the agaves and sempervivums, so exhaust themselves on bearing their flowering and fruiting spikes, that they perish after their first production, This supreme sacrifice represents a contributory type of protective mechanism by an individual plant for the preservation of the species.

Time is of the essence in the competitions and struggles of wild life; unfavorable circumstances shorten its cycle for rapid seed production; procreation is the goal. The urge of reproduction is so strong, that adverse conditions followed by more favorable circumstances, may produce several crops of seeds in one season. Nature is indeed frugal.

We are accustomed to associate the struggles of life with wild animals and Men. In their battle for survival, the **strong** destroy the **weak.** The eagle swoops down and carries off a screaming song-bird in its powerful talons; the cunning fox tracks the hapless rabbit; a hunter's bullet lays its victim low. This is the way of life; it is harsh and ruthless; it is nature.

Surely such behavior would seem incongruous in the apparent peace and tranquility of plant life. The fields and forests in their brilliant splendor seem to reflect the utmost in harmony and tranquility; however, such utopian existence is strictly imaginary. Plants battle for light; it is a fight to the finish. The conqueror, by taller growth, silently and successfully casts a deadly shadow over his rival. This warfare is grim and decisisive; without light there is no photo-synthesis; there is only death by starvation by the conquered.

The methods and implements of plant warfare are variable. The strangling figs (Ficus aurea and Ficus brevifolia) of Florida dispatch their hosts in a most dramatic manner. These jungle killers usually start as epiphytes, sprouting from seeds dropped by birds on the

rough bark of trees. The smooth roots grow downward, clinging tenaciously for support like the coils of a boa constrictor. The branching roots enlarge, encircle, and coalesce and at times completely encase the victim's trunk. The hard-wood trees are slowly but surely strangulated within their fatal embrace. When their roots are anchored in the soil, the aggressive figs grow as trees.

Palm trees frequently survive these constructing attacks, owing to the characteristic anatomical structure of their stems. As palms are monocotyledons, the structure of their trunks is somewhat similar to those of cornstalks. The maximum diameters are early attained and remain quite uniform. The coarse wiry vascular bundles in a spongy parenchyma fill their columnar axes, and external pressure produces no complete occlusion of the vascular system.

In hard-woods, the vascular system is in the thin cambial layer beneath the bark; such victims are placed under a terrific pressure because of secondary growth against the tension of the coils of the strangling figs. There is no compromise in these struggles; the solution is death to the hosts.

The banyan tree (Ficus utilis or Zulu fig), a native of tropical Asia, thrives

Compass barrel, Ferocactus acanthodes, about 3' tall, growing in adverse conditions with a foothold in a pile of granite rocks.

in central and southern Florida. Its manner of growth is most spectacular. Aerial adventitious roots from massive horizontal branches penetrate the soil, create new supports, and assume root functions. There are records of one tree producing several thousands of such trunks and covering over an acre of ground. The leathery, lustrous, evergreen foliage enhances the tropical splendor of its forest-like growth. With the fighty spread of its verdant bread-leaved canopy, this picturesque tree eliminates all competition by its deadly shade.

By mowing lawns and roadsides, we become allies to such rosette fighters as dandelions and plantains. With taller competitive growth mowed down, the dandelions take possession in a decisive victory. There flat rosettes quickly spread out and eliminate further competition by their ominous shade. With countless blooms, they flaunt their golden victorious banners in massive array. In adjacent unmolested fields and neglected lawns, where competition is keen, they may be absent or exist in limited numbers.

Florida moss (Dendropogon usneoides) a member of the Pineapple Family, is very abundant in some of the southern states. Its gray lacy pendants, swaying on the glorious giant live oaks and bald cypresses, are magnificently picturesque. These epiphytes at times asphyxiate their hosts in the competition for light; they also become a menace when they drape the citrus groves. This moss is now used as packing, in the manufacture of furniture.

Plants also compete for water and mineral salts. In the desert, individuals or species with the most efficient root systems are the survivors. The scarcity of food and water promotes unusual compensatory root growth for maximum efficiency. Haselton has described and illustrated such an unusual relationship. A cactus (Opuntia echinocarpa) less than two feet tall and one and one-half inches in diameter, developed primary roots over thirty-five feet long; and this definitely only represented a small fraction of the secondary root system. When several species are in proximity, root competition is diminished by its growth at different ground levels. Because of insufficient water, special in the desert are not crowded, as seedlings cannot thrive close to established plants.

The competition for light represents a constant struggle; however, some plants have so anatomically altered their structure as to tolerate shade. The number of stomata in the leaves of plants such as impatens and begonias, are considerably reduced. This lowers their respiratory activity and lessens their photosynthetic capacity. Such altered mechanism can only operate efficiently with reduced light. Excessive illumination would disintegrate chlorophyll faster than its synthesis, and the plant would be short lived or struggle for its mere existence in an unbalanced state. A colony of plants, growing in friendly proximity, is made possible by such adaptations. Symbiosis is only possible when the species present mutual benefits and can operate profitably. It is one of thej most striking of natural adaptations, and it has made possible the complex flora of our forests and jungles.

Nature does not pamper her subjects. Weakness is not tolerated and calls for replacement by vigorous competitors. Plants in any community have fought for their position and have adapted themselves to the conditions of their particular habitat. The battle to maintain supremacy never ends. Peace and harmony are ephemeral. Nature does not permit a static life.

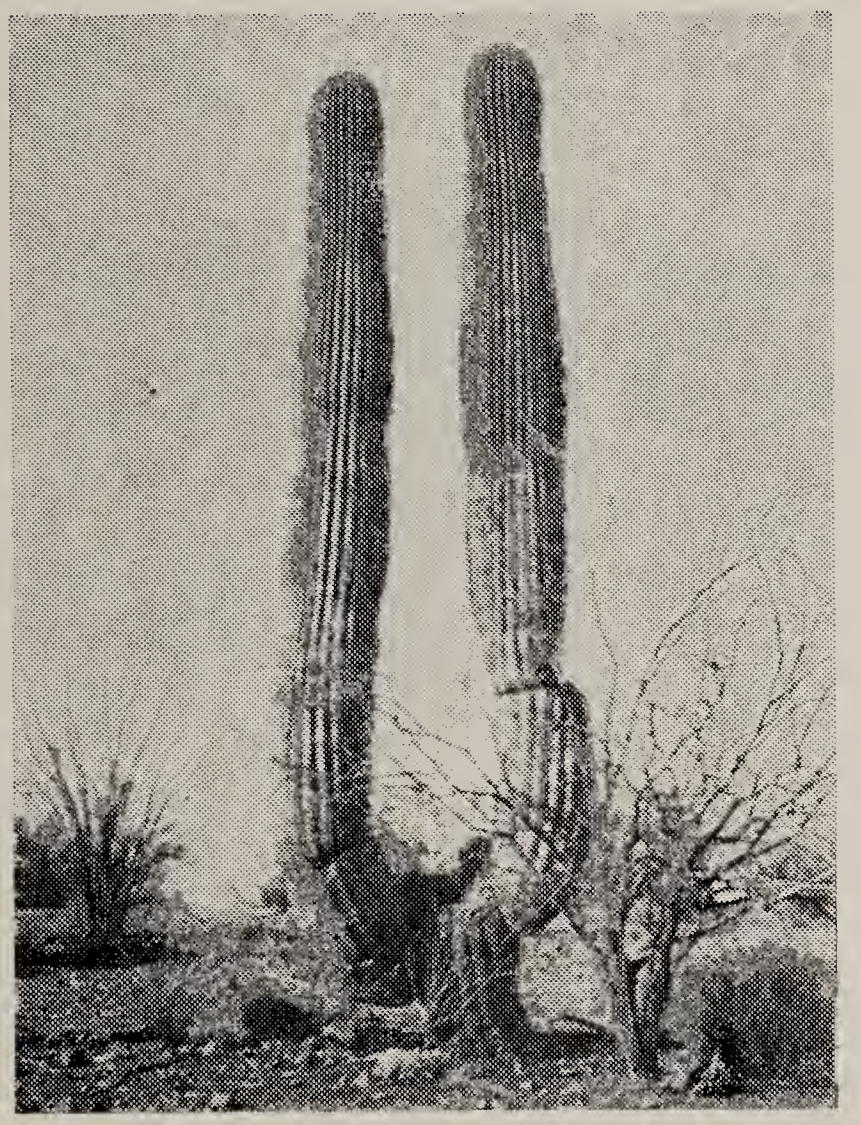
REFERENCE

Haselton, S. E., "Desert Observations," Cactus and Succulent Journal, XXI:54-55, 1949.

SAGUARO LAND BULLETIN

DESERT BOTANICAL GARDEN of ARIZONA

OCTOBER, 1958



A double Saguaro due to mutilation, heat, cold and drought. See page 95.
Photo by Ira Adams.

REG MANNING

SAGUAROLAND BULLETIN

Published and owned by the Arizona Cactus and Native Flora Society, sponsors of the Desert Botanical Garden of Arizona, P.O. Box 547, Tempe. Saguaroland Bulletin attempts to promote the Garden and to provide information on the desert plants and their culture. Subscription $3.00 per year, the subscription including active membership in the Society and the Desert Botanical Garden. Issued 10 times a year.

W. HUBERT EARLE, Editor

Volume 12 OCTOBER, 1958 No. 8

Arizona Cactus and Native Flora Society

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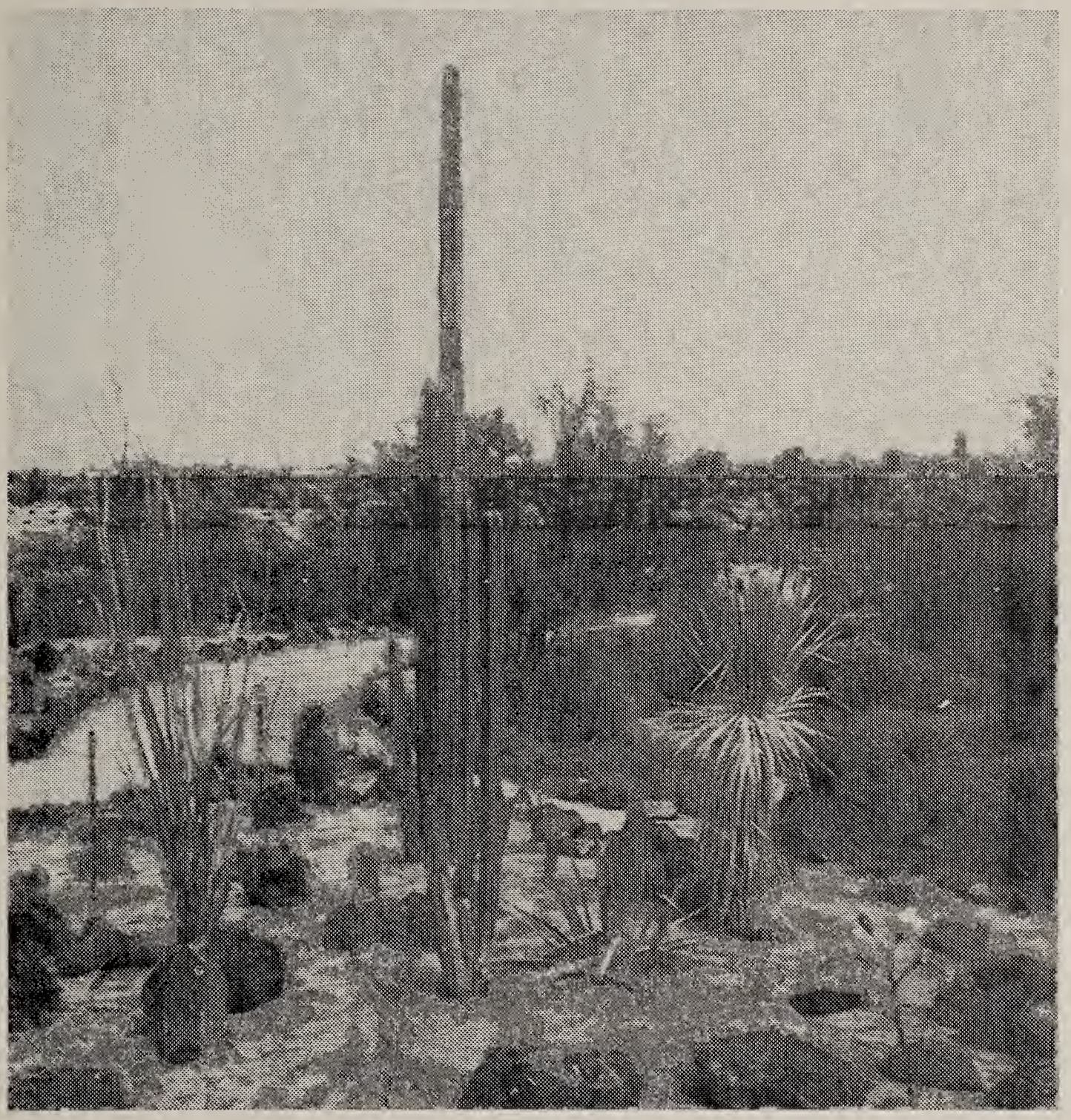


Mexican bed now planted with cactus from Mexico. Compare this picture of progress with the same bed under construction on page 63 of the June-July issue of the Saguaroland Bulletin. This bed is now planted with Mexican Poppies which will be in full bloom in February, March and April.

A portion of the W. Taylor Marshall Memorial Bed set aside in honor of our late director. The black granite marker was designed, cut and donated by our members Mr. and Mrs. W. G. Cook of Phoenix. This bed is about 2500 square feet and is planted in Arizona cactus, plants, trees and wild flowers. Many of the cactus have been donated by members of the garden.

* * * * * *

Enclosed with this Bulletin are some brochures that we wish you would pass on to persons who you know are going to visit Phoenix this winter. This will remind them of our fine Garden and give them the opportunity to acquaint themselves with the desert plants. This brochure was designed and written by Reg Manning and Mel Hinman, both active members of our Board. Over 10,000 of these brochures were distributed to Hotels, Motels, Chambers of Commerce last year and definitely aided toward our increased attendance.

GARDEN STAFF TOURS GARDENS

John Weber our Chief Horticulturist, Roy Vail, summer student from Earlham College and your Editor, left Monday night, August 9th to survey the Botanical Gardens and Cactus & Succulent growers gardens along the west coast

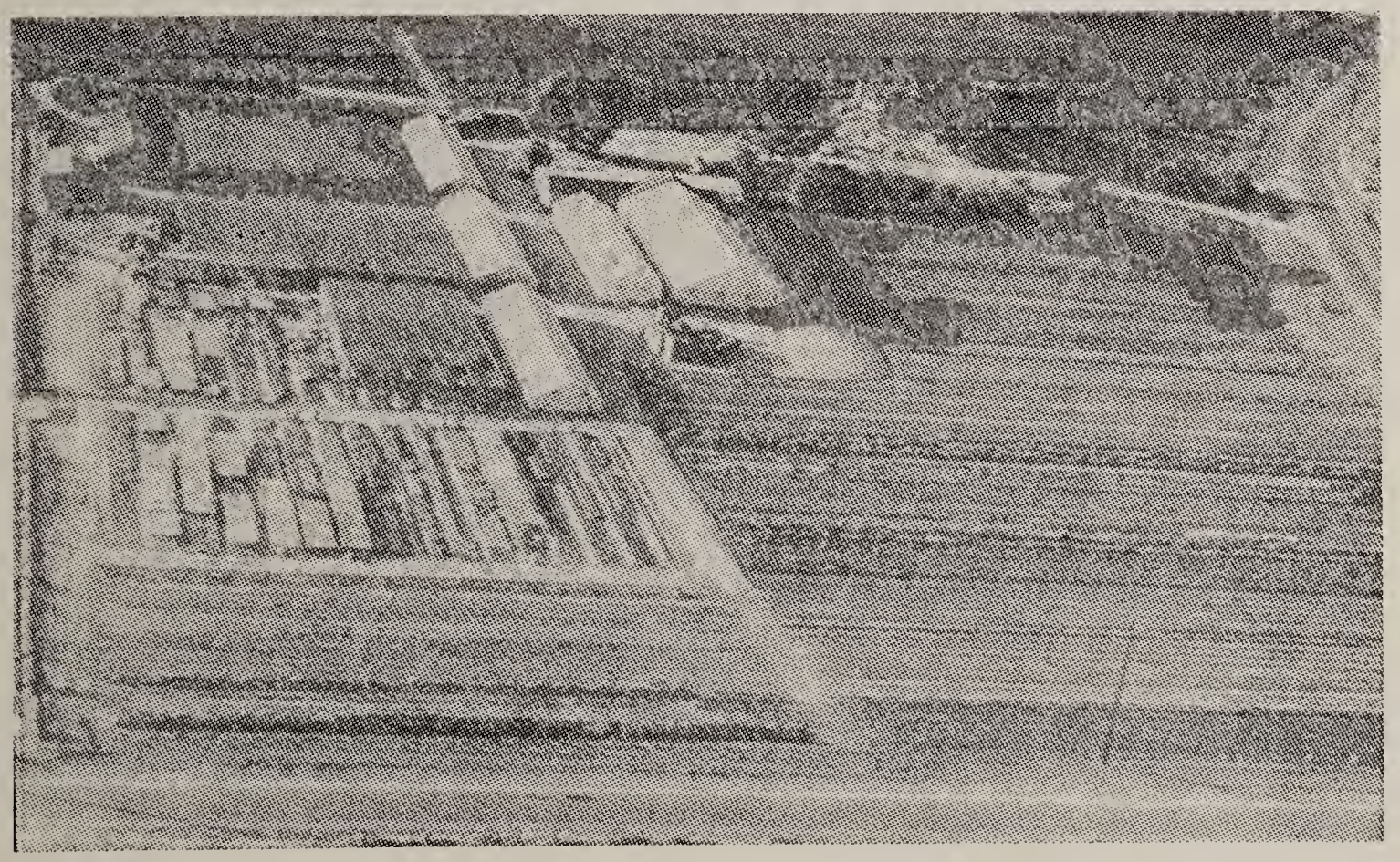
This being the first trip of this kind for the staff, we gained much information on the planting, horticulture, maintenance and care of plants during this trip. Many of the Gardens visited are older than our Garden and each of them had their own problems peculiar to their set-ups, type of plants they were growing and their experimental plantings. We found the Gardens in tip-top condition due to a good rainy season.

It was most interesting to follow the procedure of growing cactus seedings in mass production at the Gates Cactus, Inc., Corona, Calif., from seed to thousands of shipping size plants yearly. Their outside growing beds of Aloes, Agaves and specimen cactus were in fine shape. The late Howard Gates has built up a fine collection of Mammillarias and other cactus from Mexico and Baja, California and should be seen to be appreciated.

We then drove up to the Rancho Santa Ana Botanic Garden at Claremont and visited for an hour. Inspected their seed processing and excellent storing conditions. Their Cactus and Agaves sections were most interesting.

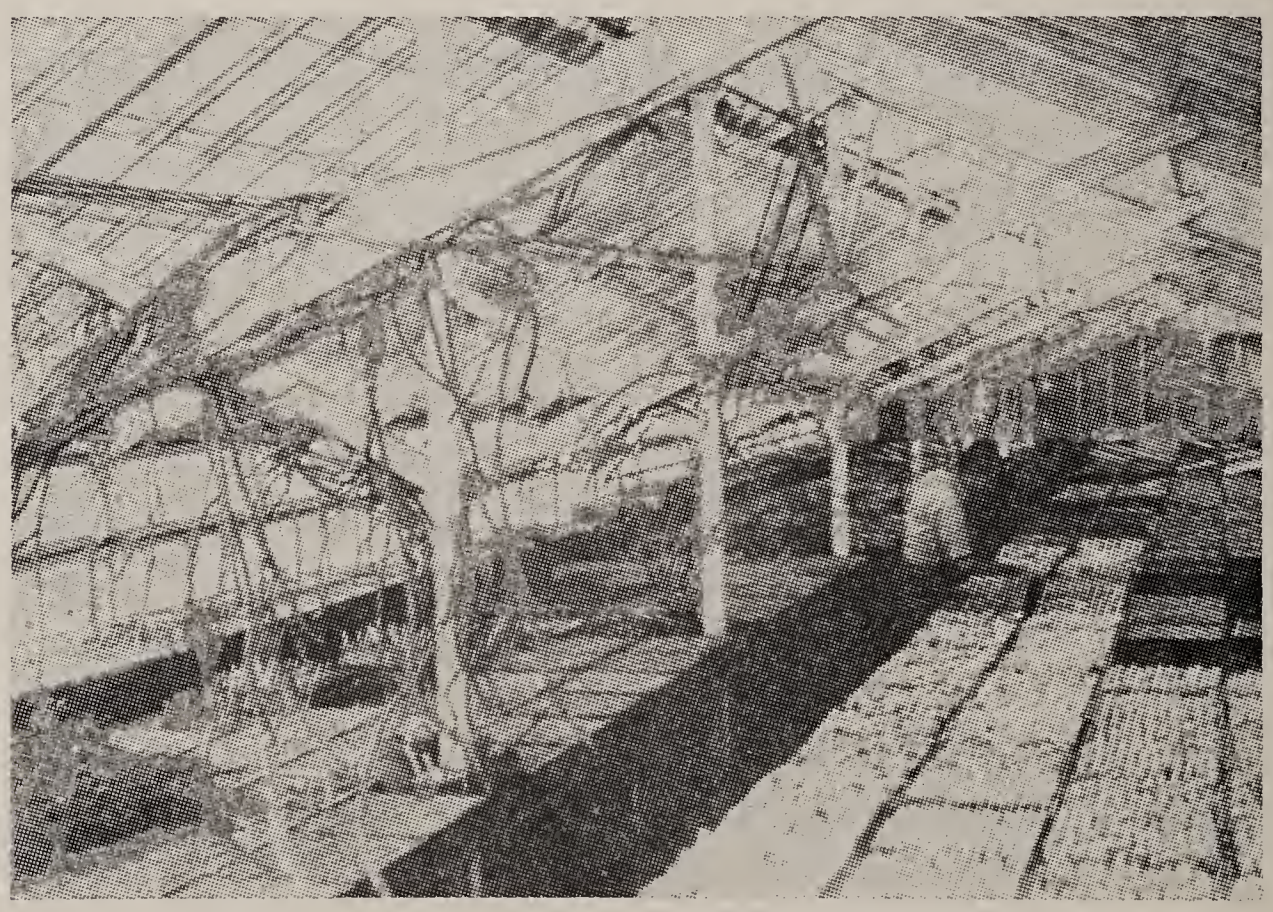
The visit to the Los Angeles State & County Arboretum at Arcadia was most satisfying. There we found many semi-desert and desert shrubs in bloom, many of which we have germinated several years ago but we still will have several years to wait for their blossoms. A vast building and planting program has been going on there for the past years and we urge our members to make a point of visiting this fine Arboretum which is just east of Pasadena.

Many persons visit the famous Huntington Library and Art Gallery south



View of the Gates Cactus, Inc., planting and buildings, Corona, Calif.
Photo courtesy of Gates Cactus, Inc.

Huntington Botanical Gardens—A planting of large clumps of Mammillarias in black volcanic rock. South American Cerei are in the background. Photo courtesy of Huntington Botanical Garden.



Interior view of one of the many greenhouses at the Johnson Cactus Gardens. Note all the seedlings in the flats. Photo courtesy of Johnson Cactus Gardens.

of Pasadena but most of them are unaware of the remarkable Cactus and Succulent and Desert Gardens southeast of the Art Gallery. There one can find one of the finest collections of specimen plants in the United States. Large clusters of Mammillarias, Cerei, Barrels, Hedgehogs, Boogum Trees, Beaucarnes, Agaves and Yuccas were brought into the Garden years ago aboard railway flat cars directly from Mexico. After the plantings of the above plants plus Palms and Cycads, the railroad was then removed.

Late in the afternoon we stopped in and saw the Beahm Gardens just east of Pasadena. Ernie Beahm showed us Kodachromes of some of his ney Epiphyllum hybrids and they certainly have wonderful colors. We envy those persons who have the weather conditions in which they can so easily grow those beautiful plants. Our desert air in Arizona is just too dry. Mr. Beahm's Haworthias all had a good color and he now has several new species for the trade.

Wednesday morning we drove to Long Beach and then to Paramount to visit the Johnson Cactus Gardens. As usual we could not tear ourselves away till noon. Mr. Harry Johnson's South American Cactus are shaping up into fine specimens having all been started from seed that he collected while in South America several years ago. His Euphorbias and Epihyllums surely grow well near the coast. We took many Kodachrome shots there as the hybrid Echinopsis were putting on a good show.

A mass planting of Sea Dahlias in the meadow of the Santa Barbara Botanic Garden in April. Photo courtesy of Santa Barbara Botanic Garden.

We left Roy Vail at Long Beach as he wished to visit some friends in that area. John Weber and I then drove up to the Santa Barbara Botanic Garden and had a most enjoyable overnight stay with Jim Blakley, who was our Botanist till 1956. He gave us a tour of the Santa Barbara Botanic Garden

where he now is the Botanist. This is a very unusual Garden located in a canyon just above the old Santa Barbara Mission. This Garden specializes in plants and annuals of the coastal side of the mountains. Jim has started a fine cactus garden in amongst some very large boulders which creates a lot of interest. Their mass plantings of wild flowers brings visitors in large numbers in the spring. Make a point of visiting this Garden for a nice quiet interlude in your travels along the coast.

Thursday morning we left Santa Barbara and drove up to the University of California Botanical Garden at Berkeley. There we were guests of Paul Hutchinson, Senior Botanist, for several days. We were so engrossed with the plants in that Garden that when we left that week-end we saw San Francisco only from across the bay.

Friday we spent most of the day cleaning and packing about 600 South American and Mexican cactus of which the University had finished Taxonomic studies. We will grow these plants at our Garden and carefully watch them for any changes in the next few years. Some of them may then be taken back to the University for further study. We are most grateful to the University and Paul Hutchinson for the use of these valuable plants. They are a most valuable addition to our collection.

Saturday we left Berkeley early with our trailer packed to the top. The trip home was hot, as expected, and the plants have all now been repotted and are growing in our dry air. Members are urged to look over this fine collection whenever visiting the Garden.

A planting of Trichocereus, Cereus and Echinocereus along a hillside at the University of California Botanical Garden, Berkeley, Calif. Photo courtesy U. C. Botanical Garden.

MINERAL COLLECTION ON EXHIBIT

The Mineralogical Society of Arizona, headed for years by Mr. Rockhound — Arthur E. Flagg, have over the years set aside their best specimens of minerals collected in the United States and abroad for future exhibiting.

John Weber, our Chief Horticulturist, and member of the Mineral Society's Collection Committee along with Katy Trapnell, another of the Garden's members, laid out the collection of over 800 speciments last summer. These were cleaned and washed, then sorted into two collections. One collection is now displayed in the new Phoenix Public Library mounted in 4 Waddell cases. The other collection is displayed in our built-in display cases in the Webster Auditorium at the Garden.

The Garden is honored to be able to display this valuable and educational exhibit to the thousands of visitors who will have the opportunity to view them. Our sincerest thanks to the Mineralogical Society for the loan of this exhibit.

The minerals are catalogued and indicated as to where they came from and how they were acquired. Many of them have a most interesting history.

ALEGRIA
RED COCKSCOMB
LADY BLEEDING
PRINCESS FEATHER
AMARANTH FAMILY

AMARANTHUS PANICULATUS L.

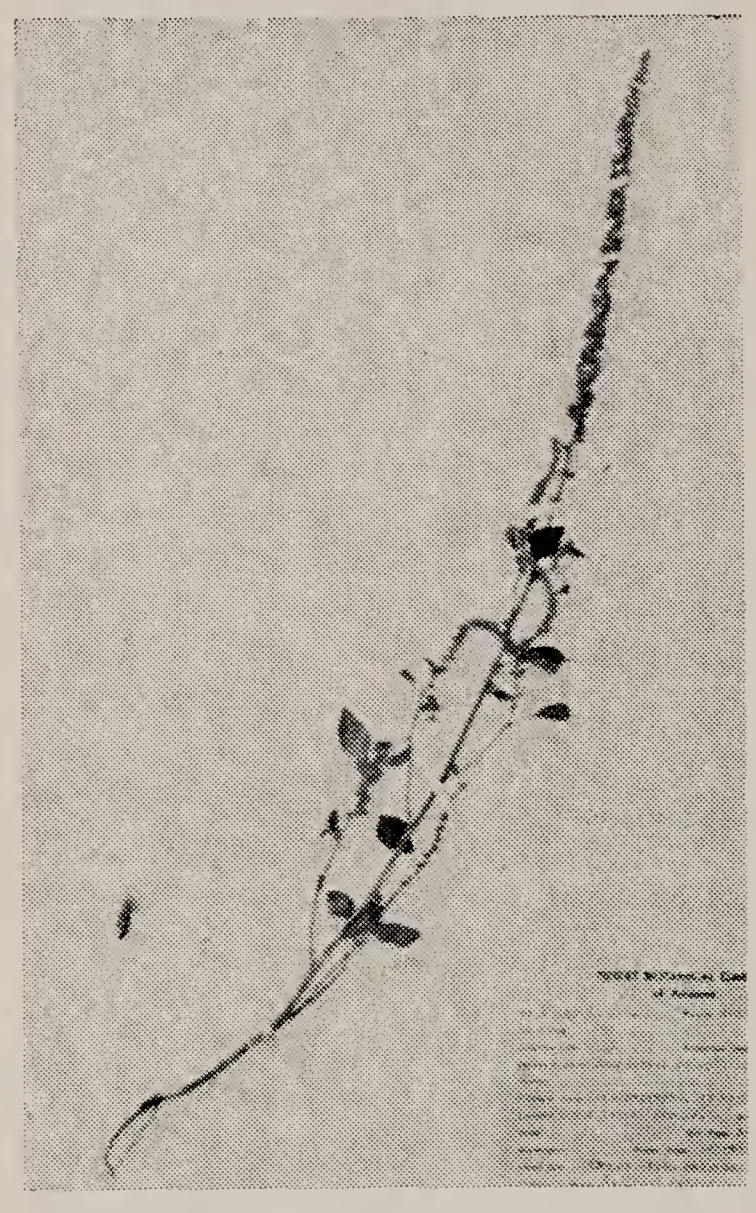
AMARANTHACEAE

W. W. H. Davis, author of "El Gringo", published in 1857, observed the following while stopping at the Pontius Pilate House at Chamita, New Mexico:

"They (the mother and daughter of the pious Pilate family) had their faces besmeared with the crimson juice of the alegria plant, and looked most frightful and disgusting. A thick coating covered the whole face, which gave them the appearance of wearing masks, with the eyes, nose, and mouth uncovered. This was the first exhibition of the kind I had seen, and it struck me as such a filthy and singular custom, that I was not slow to inquire the cause of it. Afterward, I noticed the same in all parts of the Territory, and found it to be a common and cherished practice among the village and country beauties. It is done for the purpose of protecting the skin from the sun, and they will remain in this repulsive condition two or three weeks upon the eve of a grand baile or feast at which they may desire to appear in all their freshness and beauty. The cream of the matter is, that in most instances the complexion of the wearer is about the color of seasoned mahogany, and upon which all the sun from the north to the south pole could make no impression. Besides alegria they make use of clay and starch in the same manner, and at times you will see these three colors displayed upon the visages of as many members of the same family. Perchance this belle of Chamita had been doing penance in a smeared face for several days, in order to appear in her most witching charms during the season of the court; and who knows but that ambitious thoughts had crept into her maidenly heart, and that she even hoped to be able to captivate one of the Gringos who might quarter at the Pontius Pi-

late? How do my fair countrywomen like this improvement in a lady's toilet?"

Cockscomb was brought into this region by the Spaniards, and although carefully tended in their little gardens, it gradually escaped from cultivation,



Amaranthus palmeri
Careless Weed.

and is becoming naturalized in various places.

At Taos, N. M., many find it helpful in treating heart trouble. The flowers are boiled and strained, and, to this tea, cinnamon and a very little piloncillo (Mexican brown sugar) are added. A small glass is drunk as often as seems necessary.

Some of the inhabitants of La Bajada make a bath with red cockscomb for tuberculosis, heart trouble, and jaundice. In curing jaundice, certain directions are followed implicitly: the flowers are allowed to stand four days in a glass of water; and then the strained infusion is placed on a shaded windowsill. The patient looks at it and the jaundiced eye is supposed to clear as the liquid gradually fades.

Alegria also plays an important part in the toilet of Zuni maidens, since the leaves and blossoms, crushed and moistened with spittle or water, are rubbed on their cheeks as rouge. Furthermore, they color their hewe, ceremonial wafer bread, with the feathery part of the plant.

The Hopi Indians put it to a similar use in the preparation of their ceremonial bread, piki, which is baked in thin sheets, and, while still warm, rolled. Several cylinders are then tied together, one on top of the other, and the whole string is carried by the Kachinas in various dances for distribution among favored spectators.

The word Amaranth, or amarant, is from the Greek, and means unwithering. The name was given to a number of plants that faded very slowly, and therefore were considered symbols of immortality.

Ethnobotanical excerpt from 'Healing Herbs of the Upper Rio Grande' — L. S. M. Curtin, Laboratory of Anthropology, Santa Fe, N. M.

Amaranthus palmeri; Carelessweed.

Grows abundantly along Arizona river bottoms and is cut for hay and eaten by stock either green or dry.

Amaranthus fimbriatus: Pigweed

Seeds of these plants are in abundance and are an important food source for doves, quail and other seed-eating birds.

THE SIGNIFICANCE OF HARDINESS IN PLANTS

By DR. LOUIS E. BLANCHARD
Crystal Beach, Ontario, Canada

There are many factors involved in a discussion of hardiness that make it possible for a plant to thrive in a particular environment. Inorganic factors such as temperature, moisture, light and chemical substances that are effective through an atmospheric medium are termed climatic, those that respond through the soil, edaphic.

Under proper treatment, plants may become accommodated or hardened to tempera'ures considerably higher or lower than the usual limits of the involved species. Such changes may be accomplished during a growing season in a greenhouse. Plants from a heated greenhouse, when placed for several days in a cold frame, develop an increased resistance to cold. Conversely, hardy plants grown under warm conditions may succumb to a few degrees of frost, if not subjected to a gradual hardening process.

This last spring we placed outdoors one hundred vigorous potted plants of Sempevivum tectorum var. calcareum. We assumed there would be no risk from frost damage to such hardy perennials. On the first day of their exposure they were subjected to several degrees of frost and only two survived. This represented a de-hardening process whereby resistance was lowered by a sudden temperature drop.

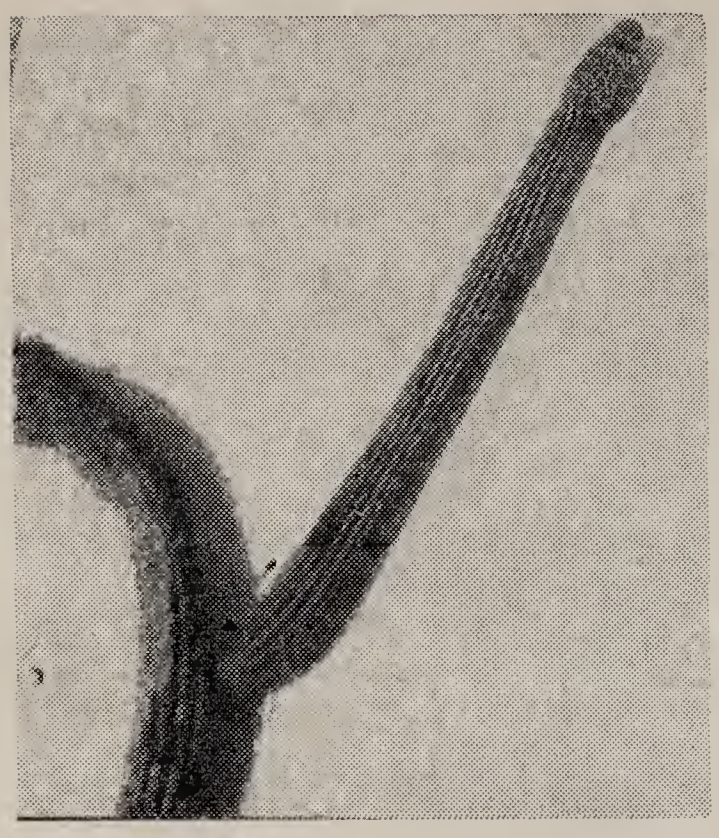
In natural conditions, many species of plants have adapted themselves to cope with particular environments. The morphological changes of cacti that made it possible for these plants to withstand heat and drought for prolonged periods, is an example of natural adaptation. Such changes are very slow and are asscciated with climatic effects through geological changes. Should tropical country become desert, only those plants can survive that have adapted themselves to arid conditions.

Although active life for higher plants is in the range from 32° to 122° F. the temperature at which the physiological processes such as photosynthesis, growth and respiration are best suited in its stage of maturation, is termed the optimum temperature. This temperature shows a marked diversity in various plants. It is low for alpine plants and high for those native of the tropics. Many alpines will tolerate temperatures near the freezing point, but will thrive in cool weather. The Opuntias prefer a temperature of about 80° but still show growth at 133° F.

Striking features of hardiness are the abilities for plants to withstand heat, cold and drought. There is apparently an increased capacity in frost tolerance when the water in the plant tissues diminishes. Seeds are miniature plants, actually desert plants, for they contain little or no water. Some seeds resist boiling for many hours and endure months of freezing.

Succulent plants, for the most part, are native to warm climates, but the native cacti in Canada and the Sempervivums in northern rockeries can tolerate sub-zero climates — 40° F. at times. This would definitely indicate that there are other deciding factors in the frost resistance of plants.

Although there is a definite relationship between scarcity of water, and cold and heat resistance, many plants are intolerant to extreme dessication. Most plants are in a critical condition when transpiration losses exceed the water intake. For a short time, they will adjust themselves to diminshed fluids, but death occurs when the permanent wilting point is reached. This situation does



A 2'-6" live Trichocereus Spachianus branch growing from a dead branch.

not apply to desert plants and particularly cacti. I have seen branches of cacti and Euphorbias thrive on dead trunks for a whole season. These plants will tolerate arid conditions for months or even years by their ability to reduce transpiration to a minimum and to store water in special tissues. At the same time, they assume a dormant condition with the lowest possible metabolic activity. Lower plant life, such as mosses, will endure total dessication. A tuft of moss on a dry sunny rock in midsummer will be dry enough to be crumbled to a powdery consistency and yet if a similar piece is regularly watered, it will return to normal growth. Many shrubs are liable to frost injury when its water contents becomes too low. This is particularly true of evergreens. Frost, wind and sunshine promote rapid evaporation from leaves and shoots and if the ground is frozen, the roots are unable to compensate for the loss by adequate absorption.

In the spring, early growth of plants and shrubs will tolerate frosts if the weather has been cool enough to harden the growth, but a similar frost following a warm spell will kill the young watery tips and new leaves. Here apparently the abundance of water is associated with a lower frost resistance. A late spring frost may be fatal to plants that withstood the rigors of severe sub-zero weather.

Many annual plants were severely damaged or killed as late as June 7 in this vicinity (Southern Ontario, Canada). Chilling of such greenhouse plants as coleuses and begonias, when suddenly exposed to tempreatures close to freezing, produces necrosis of the tips and frequently death of the plants. Damage is more pronounced in wet, poorly drained soils, as such conditions produce abundant water in the plant tissues. Dry, well-drained sandy soils promote scarcity of water with a corresponding increased tolerance to cold. and boiling points. Acids, bases and salts in solution, dissociate or ionize into electrically charged particles called ions. A molecule of ordinary table salt (Na Cl, sodium chloride) in solution will furnish a positively charged ion of sodium, NA+ and a negatively charged ion of chlorine, Cl—. Such aqueous solutions of acids and calts are conductors of electricity and are called electrolytes. Sugar does not dissociate when it dissolves and is therefore a nonelectrolyte. An acid that dissociates easily produces a large number of hydrogen ions and is called a strong acid. An aqueous solution of an acid is strong because it ionizes to a high degree, whereas a concentrated acid is weaker besause its degree of dissociation is limited.

(This article to be concluded in the November issue.)

You LIKE the Desert?

Do you want to see ALL of it in one trip?

Here in Phoenix is the Number One Desert Botanical Garden in the WORLD! The second largest (when completed) will be located 80 miles outside Johannesburg, South Africa. Scientists come from South Africa to see the Gardens here. YOU can see it this morning!

Thousands of species of cacti and desert plant life grow right here. Visitors are welcome, admission is FREE. 155,000 saw it last year. The Desert Botanical Garden of Arizona is supported entirely by private membership.

See how nature adapts plant life to an existence where there is very little water. Some plants look like rocks, and require close inspection to find them. Many other oddities peculiar to the desert are well worth the short trip to see them. See how cacti store water to carry them through dry times.

Conduct your own tour — follow the walks — identify the various types by the little brochure you receive for 10c at the office. The most entertaining, most reasonable and certainly the most enjoyable time you have spent in the sunshine learning about the desert.

You are in Arizona's Valley of the Sun, a veritable oasis in the desert. We hope you like our desert country. We hope you see all of it! DO come visit us!

DESERT BOTANICAL GARDEN OF ARIZONA

In PAPAGO PARK, east of PHOENIX

Between East Van Buren & East McDowell Road

on Highways 60-70-80-89

OPEN DAILY 9 A.M. - 5 P.M.

10/58

SAGUARO LAND BULLETIN

DESERT BOTANICAL GARDEN of ARIZONA

NOVEMBER, 1958

GRIZZLY BEAR PRICKLY PEAR
Opuntia erinacea var. ursina
The long white spines shade the plant from sun and protect it against the hot dry winds of the high desert.

REG MANNING

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ANIL
Castill (La Bajada, N. M.)
Mirasol (Spanish)
Girasol (Spanish)
Sunflower
Aster Family

Helianthus annuus L.

Compositae

The genus Helianthus, from the Greek: helios-sun, anthos-flower, contains about fifty species, chiefly natives of North America, a few being found in Peru and Chile. In New Mexico, during the early autumn, when many other flowers have passed, its brilliant yellow petals, surrounding a rich brown center, embellish many roadsides with a golden fringe.

"This plante groweth in the West India, the which is called America. Of the virtue of this herbe and floure, we are able to say nothing, because the same hath not bene yet found out, or proved of any man" — Dodoens.

Sagard - Theodat, a French Franciscan missionary — who published, in 1636, a "History of Canada" — was astonished at finding the Indians cultivating and using the sunflower. "The girls reduce the seed to flour," he writes "in the big mortar, then put it to boil in a large kettle of water, and after a while the oil swims on top of the soup, which the savages gather with their horn spoons into their gourd bowls; and not only is this oil good to eat, but also the pounded seed, which the savages esteem an excellent thing, and which I have tasted with approval."

Lewis and Clark record in the reports on their famous northwestern exploration that they found the Indians of those regions using it, and that they themselves occasionally enjoyed a dish of sunflower-seed mixed with marrow grease.

Truly, its wide adaptability to various needs reminds one of the Brazilian tree of life. The flower furnished a yellow dye, and honey; the seeds, oil, food and a dull gray-blue dye; its leaves are good for fodder, and its hardy stalk contains a textile fiber. At present, sunflowers are widely cultivated, being grown in increasing quantities in California as well as Russia, Egypt and India. It is

Helianthus annuus L.
Common Sunflower. 2-10 feet high.
West coast to Missouri.

said that the yellow sweet oil from the seeds equals olive oil for the table, and the sunflower oil - cake is exported by Russia and Sweden for stock feeding.

The Zuni employ the plant to cure rattlesnake bite, and among the Tewa Indians the fire-stick for lighting cigarettes sometimes is a dried sunflower stalk. Although treatments for respiratory afflictions often were the same — the various types of bronchitis, lung infections, and pleurisy not being distinguished — a decoction of the sunflower head was administered by the Dakota and Pawnee Indians for such maladies.

Indians also made a yellow dye by boiling the petals, and this coloration is used in basketry by the Hopi of Arizona. Erna Fergusson, in her book "Dancing Gods," alludes to the use of sunflowers in the Lalakonti ceremonial by the Hopi Indians. "All eyes turned to the kiva," she writes, "and then we saw Lakone and the two Lakonemana. Lakonetaka was a yellow and white figure; his face, body, and arms and legs were painted yellow with the sunflower pollen, and he wore white ceremonial garments . . . They told us that yellow was the color of the North".

In the small village of La Bajada, where this annual herb is called castillo, I was told that a bath is prepared with the green or dry leaves for rheumatism and pains in the bones.

Anil, with the accent on the first syllable, is the local name for sunflower, but anil with the accent upon the last syllable, is the local word for bluing. The Spanish dons brought indigo (which they called anil) and sheep with them from old Mexico, and taught the Indians how to weave and color their woolen blankets. Hence the local word of this introduction.

Helianthus canus
Hairy Sunflower. 1-2 feet high.
Calif. to Texas.

The Indians used to test the indigo by dipping a piece in water and lighting it, the flame determining whether or not it was of the desired quality.

Bluing is now given to horses for heaves. And for indigestion, one drop of quicksilver bought at a pharmacy, and three or four of bluing in one-half cup of water is administered. Bluing is also advised in this vicinity, taken internally with luke-warm water, as a vermifuge for people, horses and dogs.

Ethnobotanical excerpt from "Healing Herbs of the Upper Rio Grande' — L.S. M. Curtin, Laboratory of Anthropology, Santa Fe, N. M.

The following four pages comprises our new price list of books, slides, seeds, etc. and can be 'lifted' out. If you need any extra price lists please write the Garden. An enclosed 'Business Reply Envelope' is enclosed for your convenience in ordering items from our Book Store.

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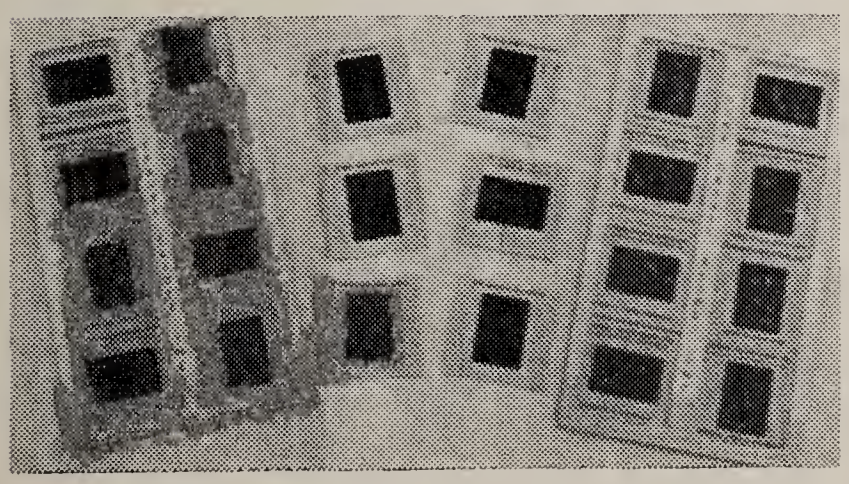

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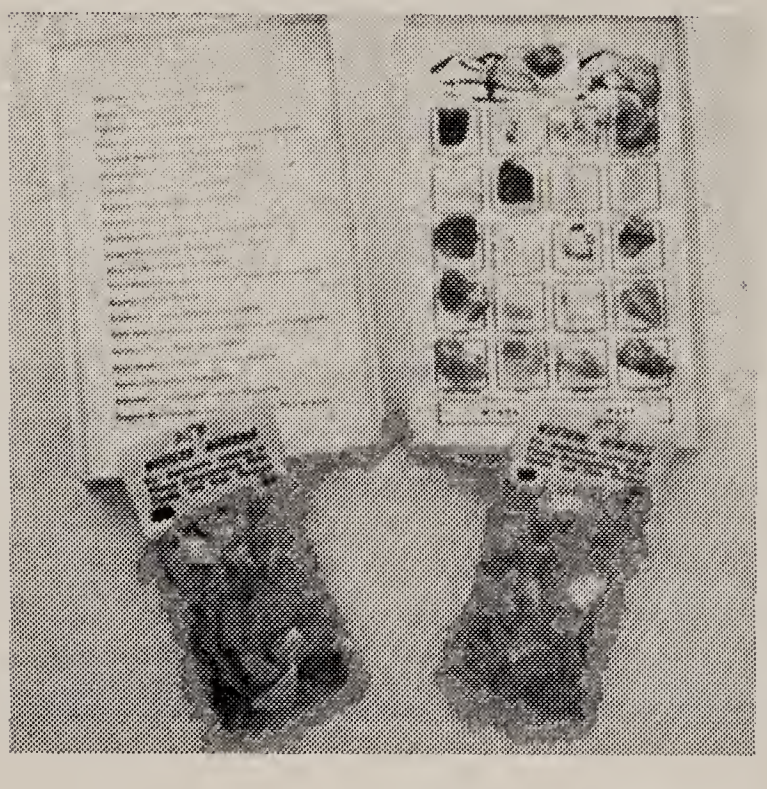

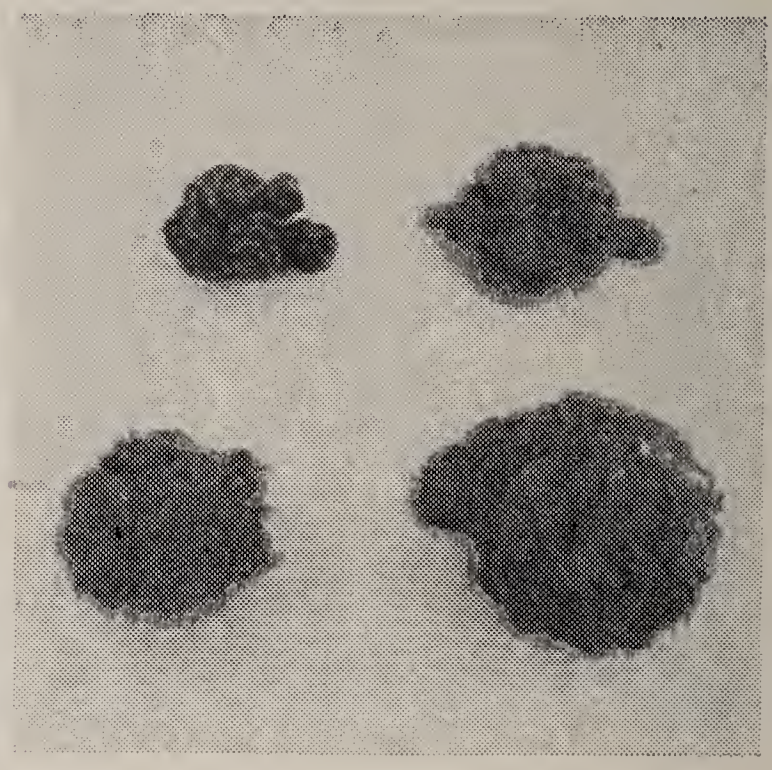

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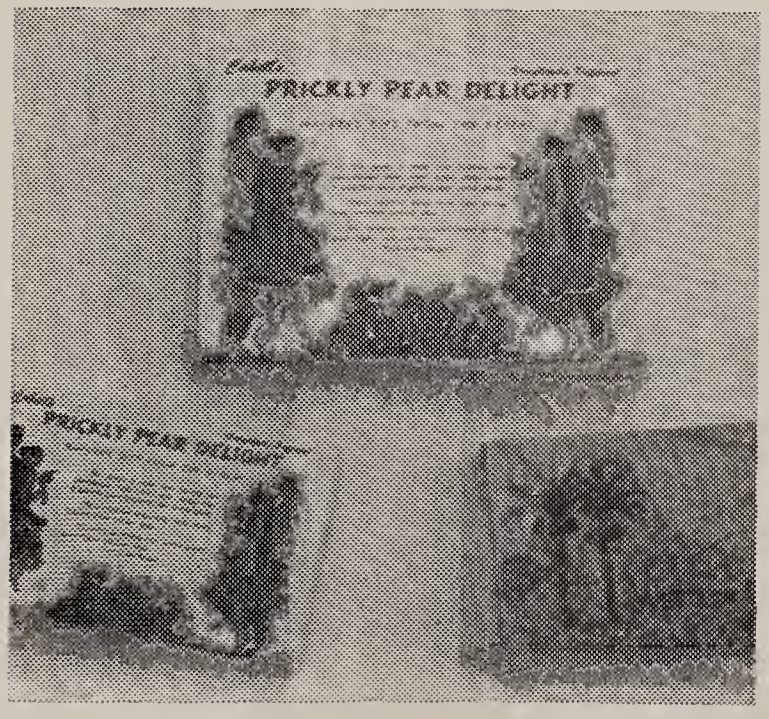

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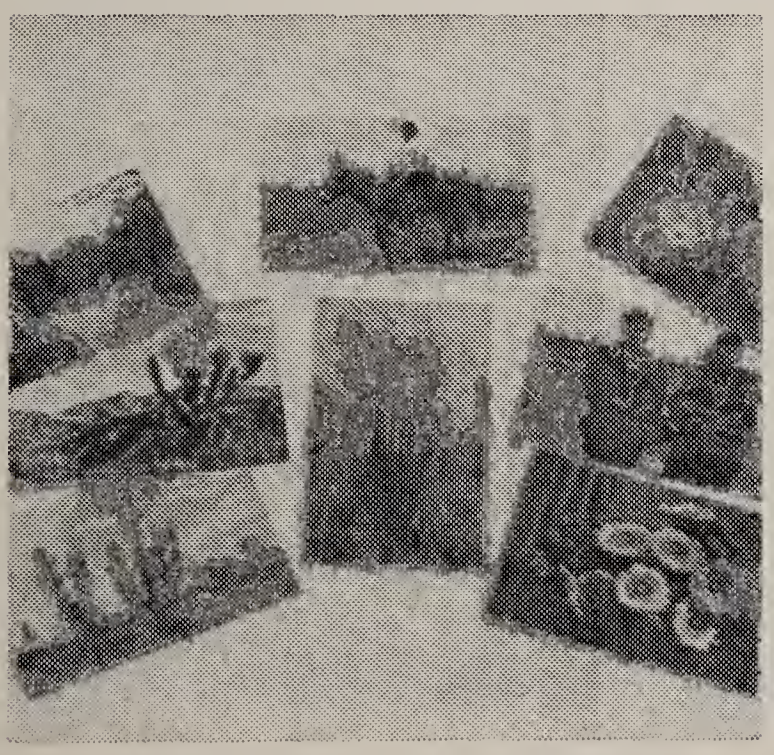

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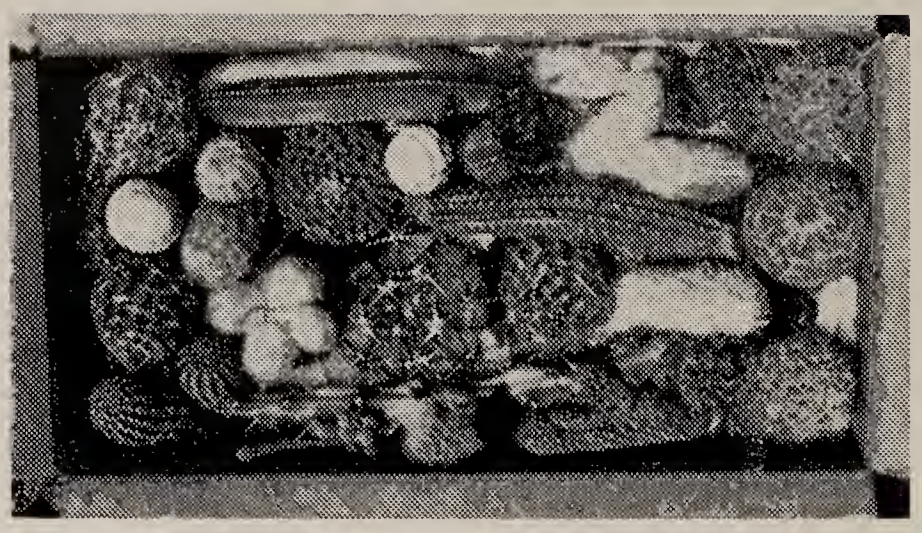

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A brochure explaining the Kachina Lore accompanies each doll.

Some of our Bookstore Books

THE SIGNIFICANCE OF HARDINESS IN PLANTS

By Dr. Louis E. Blanchard, Crystal Beach, Ont., Can.

(Continued from last month.)

When germinating seeds of winter wheat, are chilled for certain periods they acquire a winter-hardiness; plants grown from such seeds, flower earlier and may be sown as Spring wheat. This technique of vernalization has a particular agronomic appeal to the Russians, for it enables them to produce reliable crops where the growing season is short because of frost or drought. The problems of vernalization are further complicated by the facts that the period of day length (photoperiod) and temperature and nutrition, have definite influences on flower formation. In greenhouses, the response of chrysanthemums to photoperiodism by the use of artificial lighting and shading to retard or accelerate bud formation, has made it possible to produce this crop the year round. For these plants, a minimum night temperature of 60° F. is essential for proper bud setting. After bud formation, they may be grown at lower temperatures and the period of blooming delayed, if this is desired.

As a rule, increased temperatures within physiological limits, hastens maturation. It has been shown that an unusual condition, such as reversed night temperatures, may so anatomically alter a plant as to prevent bud formation. Euphorbia pulcherrima (poinsettia), a short dry plant, will not blossom in short days when the night temperatures are 75° F.

There is a definite relationship between age and resistance. Young seedlings are so sensitive to climatic changes that even a brief exposure to hardships may be fatal. At maturity, resistance is at its maximum and declines with old age. The intricate and complex chemical reactions which are governed by hormones are the controlling factors in age. Aging is due to diminished hormone productions and they are often the deciding factors whether one is young at 70 or old at 35. They are equally important to the plant and animal kingdoms. They control the rhythm of life from birth to death. Their benefits are

Echeveria sp. This plant will show a beautiful coloration in the winter if kept dry and in the sun.

colossal; their future possibilities stagger the wildest imagination. Many former mysteries of life, now have clear scientific explanations.

Although it is customary to obtain varieties and strains of plants that will possess desirable characteristics of quality and resistance through selection and hybridization, it is now recognized that the normal hereditary rhythm may be modified or suppressed by environmental factors such as temperature, light and nutrition.

Frost and heat resistance in plants have a definite relation to the nature of its sap. These qualities are inherited or modified by hardening processes. The cap contains salts, sugars and organic acids, and the presence of these substances in various proportions in solution, explain some of the factors of heat and cold resistance. The number of particles in a solution affect its freezing and boiling points. Acids, bases and salts in solution, dissociate or ionize into electrically charged particles called ions. A molecule of ordinary table salt (Na Cl, sodium chloride) in solution will furnish a positively charged ion of sodium, Na+ and a negatively charged ion of chlorine, Cl—. Such aqueous solutions of acids and salts are conductors of electricity and are called electrolytes. Sugar does not dissociate when it dissolves and is therefore a nonelectrolyte. An acid that dissociates easily produces a large number of hydrogen ions and is called a strong acid. An aqueous solution of an acid is strong because it ionizes to a high degree, whereas a concentrated acid is weaker because its degree of dissociation is limited.

The sap of cacti and other succulents contains salts, sugars and acids which have a marked influence on resistance to cold as well as heat because they act as electrolytes. Sulphuric acid is the electrolyte in a lead storage battery and the battery solution will not freeze when in full or high charge. The salts and organic acids by their ionization, lower the freezing point of the sap. They produce about three times as many ions as undissociated sugars. Sugar cane is very rich in sugar but thrives only in hot regions. Sugar maples apparently do not possess unusual resistance to cold. Starches are insoluble and exert no temperature effects. Acidity in plants is higher at night when the temperature is cool because of the increased solubility of carbon dioxide which produces carbonic acid.

In the rapid growth of plants in the early spring, the salts and acids enter chemically into new tissue production. The temporary loss of these substances reduces the osmotic pressure in the cells and water quickly enters to restore the turgidity. A sudden drop in temperature will easily freeze cell sap so diluted. In a hardening process under cool conditions, the consumption of minerals and acids into tissue formation is retarded and the plant cells become stronger electrolytes with higher antifreeze properties. Plants or trees lose considerable frost resistance after bearing heavy crops. Under such conditions, the sugars, acids, salts and vitamins are reduced. There is a loss of vigor, and alternation of crop bearing becomes an economical compensatory measure. During the early period of recuperation from these deficiences, defoliation or abnormal pigmentations occur. Properly balanced fertilizers appled as needed, will eliminate such hazards.

In spite of all the factors mentioned, the fact remains that even in the desert, where the sap of succulent plants is highly acid with high osmotic activity, plants may freeze without damage. One may assume the existence of a further protective substance in the form of a hormone, which so affects the colloidal state of the complex protein in the protoplasm of the cells, as to prevent coagulation and subsequent disintegration on freezing.

During the process of hardening in plants, various reactions occur that enhance their beauty. The action of sun and wind, particularly so in dry weather, increases transpiration losses. This increases the degree of acidity of the plant sap and a variety of colorful tints are produced. Echeveria pulvinata has no brilliancy during the winter if the water supply is abundant, but if grown on the dry side in a cool temperature and in a sunny position, the leaves develop a beautiful rich red color due to anthocyanins in the sap. Many pigments increase their intensity with an increased degree of acidity.

In cool weather, there is considerable disintegration of chlorophyll which contains both yellow and green pigments. The circulatory removal of the decomposed thermolabile green pigments leave behind the the thermostabile yellow xanthoprylls. In the late summer and autumn, the warm sunny days promote sugar formation in excess to the physiological requirements, because of the lowered plant activity during the cool nights. Withholding plant foods during this period to aid winter hardening, also tends to increase the sugar content by lessening the food requirements that would ordinarily be used for new and active growth.

High sugar contest may be instrumental in brilliant pigment formation, as sugars enter into the molecular construction of the anthocyanins. Maple foliage is very colorful in autumn. The hues range from purple to red when mixed with the chlorophyll pigments (green

Opuntia compressa var. machrohiza. Note the dessication of the pads due to cold weather. of the past winter. Photo by R. C. Proctor.

and yellow). In succulent plants growing in optimum conditions, pigmentation represents a defense mechanism by preventing excessive chlorophyll destruction in prolonged brilliant sunshine.

Color signs may represent health or disease. Phosphorus deficiency in a tobacco plant produces abnormally dark green leaves; the same deficiency causes purpling of the leaves in certain strains of corn. In chrysanthemums, nitrogen deficiency causes the tops to lose their dark green color, with a fading through stages from pale green to yellow. The lower leaves turn yellow, then brown, and die, but cling firmly to the plant. In potassium deficiency, the lower leaves show a marginal browning which is usually associated with chlorotic areas. Many diseases are caused by nutrient deficiences, in plants and animals alike. Coloration under adverse climatic conditions is due to an accumulation of the products of chlorophyll disintegration and other pigments in a sluggish circulation. The condition is somewhat analogous to the bluish coloration we may assume on exposure to cold. The chilling, by constricting the blood vessels, produces a vascular resistance which is responsible for the passive congestion of the dark venous blood.

The discussion of any phase of life involves many complex problems. Man has discovered the magic wand of science in the inner sanctum of the research laboratory. Its mere touch dispels the clouds of chaos and confusion. Its guiding light points out the way of progress. The trail is a most difficult one to blaze, as nature discloses her precious secrets reluctantly. There is a holiness in the light of knowledge for he is nearest God, who knows nature best.

Opuntia gosselliniana. Dry and cold weather will cause this plant to develop a deep purple coloration. The Purple Prickly Pear of Arizona is a variety of the above plant.

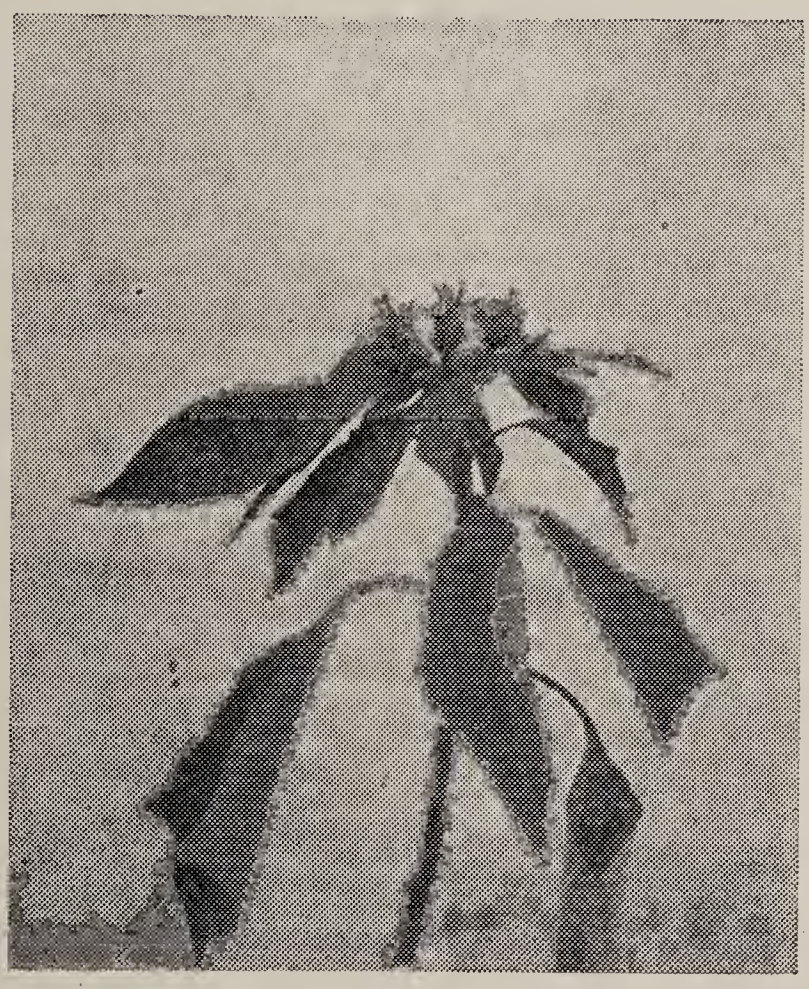
CALENDAR OF EVENTS FOR NOVEMBER AT THE GARDEN

4th 8 P.M. — Cactomaniacs
5th 3 P.M. — Class — 'Deserts'
6th 3 P.M. — Lecture — Arizona Trees & Shrubs
12th 3 P.M. — Class — 'Desert Plants'
13th 3 P.M. — Lecture — Arizona Birds & Reptiles
19th 3 P.M. — Class — 'Succulent Plants'
20th 3 P.M. — Succulents other than Cactus
26th 3 P.M. — Class — 'Xerophytes'
27th 2 & 3 P.M. — Lecture — Arizona Cactus

SAGUARO LAND BULLETIN

DESERT BOTANICAL GARDEN of ARIZONA

DECEMBER, 1958



POINSETTIA
Euphorbia pulcherrima
See pages 117 and 120

REG MANNING

SAGUAROLAND BULLETIN

Published and owned by the Arizona Cactus and Native Flora Society, sponsors of the Desert Botanical Garden of Arizona, P.O. Box 547, Tempe. Saguaroland Bulletin attempts to promote the Garden and to provide information on the desert plants and their culture. Subscription $3.00 per year, the subscription including active membership in the Society and the Desert Botanical Garden. Issued 10 times a year.

W. HUBERT EARLE, Editor

Volume 12 DECEMBER, 1958 No. 10

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FROM THE: — OFFICIAL BOARD
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TRIP TO SOUTHEASTERN ARIZONA

By J. WARNER DODD, Phoenix

On June 2nd, I had the privilege of going on a trip with W. H. Earle for the purpose of checking certain plant distributions in the southeastern portion of the State.

We left quite early and first stopped at the Arizona-Sonoran Desert Museum going by the way of Cortaro and Picture Rocks where a wonderful stand of Saguaros were in fruit and also observed, at the western end of the Tucson Mts., many wildflowers. We spent the morning at the Museum and had lunch with Director W. Woodin, Alan Blackburn and John Haag, all members of our Garden.

At noon we drove towards Benson, turning south at Mountain View (Hwy 383) and saw our first good stands of Yucca arizonica, Dasylirion wheeleri (Desert Spoon) and Echinomastus intertextus along the west slopes of the Empire Mts. Towards Sonoita we saw Agave palmeri and scattered plants of Agave parryi var. huachucaensis. East of Sonoita we camped at the south end of the Whetstone Mts., and spent several hours vainly looking for Mammillaria lasiacantha that had been reported found in this area. Here we saw our first Echinocereus pectinatus var rigidissimus (Arizona Rainbow) and many Echinocereus fendleri and Coryphantha vivipara var. arizonica. We turned into our sleeping bags at dark and several small skunks investigated their intruders but finally left us so that we finally got some sleep.

Tuesday morning we collected Agave palmeri offsets at our camping site and later in the morning in Ramsey Canyon in the Huachuca Mts., we collected offsets from Agave parryi var. huachucensis.

We then headed east across the valley to Bisbee but first stopped at Hereford to visit with Mrs. Nona Mott. She has a fine collection of cacti in a greenhouse most of them in show condition. Cactus fanciers should stop in and see her fine plants and make her acquaintance. She writes for magazines and is on several Round Robins.

We stopped several times in the Mule Mts., near Bisbee but noted nothing of interest and then proceeded to Douglas which is just a few miles north of the Mexican boundary. We then headed east on a secondary road to the Guadalupe Mts., and hoped to then drive north to Rodeo, N. M. As the road became worse and our gas supply was getting low, we stopped at a ranch and inquired about the road to Rodeo as shown on the map. The rancher said that road was just an old cow trail

which had been abandoned 20 years ago and it was over 80 miles to Rodeo. As we were turning around, he noted the emblem of the Garden on the car and said "You ought to see my 'sword cactus' that I dug up several miles S/E from here. It is now at my son's house just down the road" We assured him we would stop for the name "sword cactus" intrigued us. On stopping at the son's house we found the plant was Peniocereus greggii, known to us as "Arizona's Queen of the Night'. I still can't figure how 'Sword' applies to this night-blooming cereus. It surely is a unique name. The hillside behind the rancher's home was covered with Echinocereus pectinatus var. rigidissimus, many of them 12 to 18 inches tall and drooping.
drooping (as shown below):

We then headed back towards Douglas but first went down to Quadalupe Canyon which is in the extreme corner of the State. New Mexico, Arizona and Mexico boundries meet in the Canyon just about 100 yards from the road. There we found the Arizona rainbow hedgehogs growing on bare red stand-

Echinocereus pectinatus
var. neomexicanus

stone rock in the direct sun. These plants were much more colorful than those found amongst grasses. Also observed an Agave toumeya var. that is endemic to a small area along the road to the canyon and we collected a few offsets.

We drove back toward Douglas at sunset and camped in the Perillo Mts., several miles east of Douglas. The next morning we found at our campsite Echinocereus pectinatus var. neomexicanus. The plants are rather scarce and are found in granite as well as limestone as indicated in several cactus books. It was strange to find Peniocereus greggii in this same area growing in the granite rocks as we usually think of them growing in loose soil.

Wednesday A.M. we drove into Douglas and then S/E to Rodeo on hwy 80 and along the way collected Mammillaria hemisphaerica, Echinomastus erectocentrus and Coryphantha vivipara var. aggregatta which had pectinate spines. At Rodeo we turned off to Portal and Paradise. We worked the flats towards San Simon and then back to the Chir-

Escobaria tuberculosa found by Mrs. Monie Speck in 1957

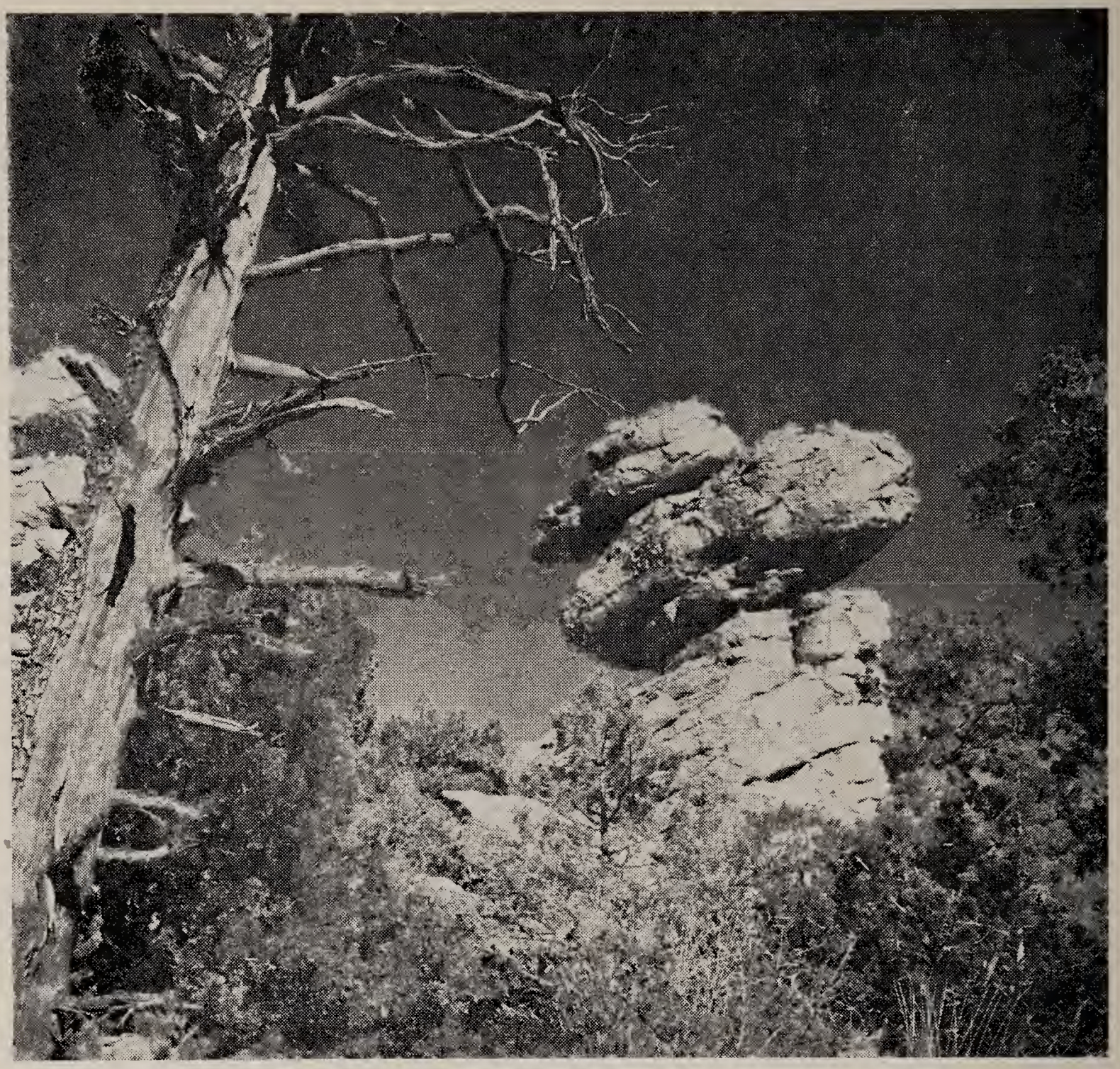
Mammillaria microcarpa with extra long thin spines

icahua Mts., looking for Escobaria tuberculosa that had been found there several years ago but we had no luck except that we found many small Mam. microcarpas with very long thin hooked spines growing in the cracks of domite rock.

We drove over the mountains and arrived at the Chiricahua Nat. Monument in the early afternoon. Met Supt. Forest Benson, Jr. who graciously showed us their Herbarium and answered our many questions pertaining to the plants of that area. Later walked their nature trail and then drove over the paved roads in the park to the various lookouts that give you a better idea of the vastness and pecularity of the balancing rocks. There were many shrubs such as Chockcherry, Mountain Lilac, Apache Plume in bloom also Verbena, Prickly Poppy, Echinocereus triglochiatus and Opuntia versicolor

Wonderland of Rocks from Massie Point, Chiricahua National Monument.

National Park Service photo



Rock figure called "The Duck." Chiricahua National Monument.
National Park Service photo

We camped overnight in the Monument's fine camping area and were awakened the next morning by a symphony of song by many species of birds, each attempting to outdue the other. This is a fine place for bird-watchers to spend a week.

Thursday we drove north towards Dos Cabezas but before reaching the town we turned to the east and spend some time at Apache Pass collecting Echinomastus intertextus and Echinocereus pectiatus var. rigidissimus. This Pass overlooks old Fort Bowie which some day may be under the National Parks system. As we collected plants in this Pass we could not but think of all the early travellers who were ambushed and massacred by the Indians in these mountains until Fort Bowie was established for the protection of the travellers and early ranchers.

We drove on to San Simon and looked for Coryphantha muehlenpfordtii var. robustispina but it is becoming quite extinct in this area. We noted that cattle were eating the stiff branches of the Koberlinia spinosa (Crucifixion-thorn) The vegetation the area was quite dry. We were now back on the de-

sert and it was quite hot after spending the previous day up in the mountains.

In Texas Canyon, 9 miles east of Benson, we found Eyrthrina flabelliformis (Coral tree, Coral bean) in full bloom but no seeds were ripe. The area had a good representation of wild flowers for that period of the summer. About 3 miles west of Benson, we stopped at the home of Mrs. Katherine McCurdy, who has been one of our members for over ten years, and viewed her collection of cactus and wild flowers gathered from that area. She has started many of her plants from seed and they were doing fine. Her Penstemon plants were very large for their size and many species were evident.

We then drove to Tucson and spent the nite with members Mr. and Mrs. Alan Blackburn who are growing and acclimating many Mexican cactus plants to the Tucson area.

Friday morning we drove to the new mining town of San Manuel and along the way we collected about 10 pounds of Ferocactus wislizenii (barrel) seeds. At San Manuel we saw an unsual cactus garden outlined with cholla branches created by one of our members William Blomquist, teacher at the San Manuel H. S.

We then drove to Superior by the way of Mammoth, Hayden and Ray and spent some time at the Boyce-Thompson Arboretum with W. Benson their Botanist and then headed for Phoenix.

In conclusion, I must say, checking plants is not a picnic, but as soon as its warm enough, I plan to again revisit this portion of the State just to get familiar with what is there. Also I must add, this was a very enlightning and delightful experience, to say the least.

AMOLILLO
WILD LICORICE
PEA FAMILY

GLYCYRRHIZA LEPIDOTA NUTT
LEGUMINOSAE

Amolillo is a perennial, herbaceous plant with tall erect slender stems, at times reaching ten feet in height, and has odd-pinnate leaves and racemes of inconspicuous greenish-white flowers. It is closely related to the Old World licorice Glycrrhiza glabra L. which furnishes a living to large numbers of northern Syrians who gather the roots upon inland downs and carry them to Alexandretta for shipment.

The word licorice is descended through the French and Latin from the ancient Greek, glykys-sweet, and rhiza-root.

The local folkname was given the plant because the early settlers soon noticed that its roots would foam like those of Amole when stirred in water. Hence the name Amolillo with its suffix implying similarity, in the same way we make rosette from rose.

Glycrrhiza lepidota in bloom.

One summer, while scrambling over the ruins of a distant Indian pueblo, I came upon some faint wagon-tracks so appealing in their direction that we simply had to follow them. My car soon became a combined kangaroo and porpoise that would have put the celebrated jumping frog of Calaveras County to shame. Such was the "road" — where could it lead among those dry foothills spotted with stunted junipers? A willow-sheltered streamlet at last sweetened the way and soon there was a house; farther along there was another, and the place was called Ciruela. A woman surrounded by ten children appeared in one of the doorways and with a cheerful smile asked me to enter. My car was the first she had seen in a year. The conversation turned to the use of amolillo and the kindly senora told me that her children had been born while she was alone and unattended. She had found that amolillo roots washed, mashed and frothed in water, strained through a cloth and a glass taken three times a day before meals, beginning the third day after parturition and continuing until the flow came, had greatly helped her. She especially recommended this remedy in cases of retention of the afterbirth, or when fever developed in the mother.

At Prado, for clotted blood, caused by an accident, or for a wound caused by a shot, the ground root is beaten up in water, and the water and foam are drunk until the clotted blood is carried off.

In Chimago, raw rice is ground fine, a tablespoonful added to a glass of strained amolillo tea, and drunk three times a day before meals as an emmenagogue.

Glycrrhiza lepidota in fruit.

Ethnobotanical excerpt from 'Healing Herbs of the Upper Rio Grande' — L. S. M. Curtin Laboratory of Anthropology, Santa Fe, Ne. M.

This is an unusual plant of the Leguminosae in that it has brown burr-like fruits covered with hooked prickles. It is a good soil binder but the crude glycyrrhizin in its sweet roots is hard on fertile soil. This plant is found in Arizona's northern counties, New Mexico and California and then Ontario, New York to Washington.

MEMBERSHIP APPLICATION ENCLOSED

The Garden now has 495 members to date which is the highest in its history. Would you help us get over the 500 mark before the end of the year by encouraging an interested person to join the Garden? A business reply envelope is also enclosed. Thank You!

FACTORS IN THE CONTROL OF FLOWERING

By LOUIS E. BLANCHARD

Box 67, Crystal Beach, Ont., Canada

It is spring. The crocus emerging through the March snow heralds the season with its glory. A host of other plants will burst into bloom with the changing year. This panorama of floral grandeur is not a haphazard profusion of flowers; it is an orderly sequence in which each variety develops an irresistible urge to bloom at a predictable time of its season. What is this controlling power, so precise and so punctual, that compels violets to bloom in the spring, lilies in the summer, and asters in the fall? What dominating force abruptly induces a plant to change its mode of life from a strictly vegetative form (leaf and stem growth) to a reproductive stage of flowering and fruiting?

This phenomenal differentiation of the growing bud is induced by two sets of interreacting factors — environmental and specific. Environmental factors, such as nutritional balance, favorable temperature, and light intensity influence the time of flowering by its effect on the rate of vegetative growth and food storage. Although such factors are nonspecific in their action, they nevertheless promote earlier flowering when they are favorable; they retard or even suppress blooming when they are biologically antagonistic. Limited light and subnormal temperature adversely influence vegetative growth and flowering. Due to seasonal variations of light, three months of summer growth is equivalent to five months of winter growth in northern greenhouses. At a temperature of 55°F, neither chrysanthemums nor poinsettias initiate buds at their normal blooming time. Environmental factors have definite modifying effects, but never initiate or control flowering.

Plants require a definite amount of growth before expressing their maturity by bloom. This may require a few weeks for annuals, or many years for certain perennials. Stocks (Mathiola incana) are sufficiently developed for floral initiation after they have formed at least ten leaves, providing the conditions are favorable. Auxin is the hormone which regulates vegetative growth, and as long as conditions are favorable for auxin concentration, the plant growth will be vegetative.

The century plant (Agave americana) affords an excellent example of the relation between food storage and flowering. This succulent plant blooms but once, and only when it has accumulated sufficient food material for this vital function. Depending on the environment, this may take 5 to 75 years, and its span of life will vary accordingly — but not as long as its popular name implies. When sufficiently developed, it consumes its entire energy in a burst of spectacular floral vigor with an inflorescence up to 30 feet in height within a month; then it dies from sheer exhaustion when its seeds are ripe.

Since flower, fruit, and seed development require large amounts of quickly available food, the mechanism which curtails vegetative growth with consequent storage and diversion of the food supply for vital reproductive purposes, has a genetic adaptive advantage. However, there is conclusive evidence that adequate food supply does not initiate flowering, but is nevertheless significant in the flower and fruit development.

It is definitely established that the floral response is due to the biosynthesis of a specific hormone, and not the nu-

Flower stalk of Agave americana growing at the rate of 16 inches a day.

tritional status of the plant. This hormone (florigen) is responsible for the abrupt shift from the vegetative to the reproductive phase of the plant's life. The curtailment of vegetative growth that normally consumes most of the food for tissue structure, now leads to food storage for vital reproductive formation and development. If adequate food supply initiated flowering, then cabbages, carrots, and beets grown from seed would bloom during the latter part of the summer when the stored food was at its peak and the weather was still warm. Any prolongation of the warm period is also ineffective for floral induction. Even when such plants are transferred to a warm greenhouse for the winter, they still continue to grow vegetatively. (The specific factors for the floral stimulus are explaned elsewhere in this article.)

Greenhouse plants grown under normal conditions of temperature and light, but with excessive nitrates and moisture, produce a lavish succulent growth with delayed blooming. With balanced fertilizers and with water reduced to the adequate amount, the plants are shorter and firm, and bloom earlier, but at their normal time. This has led some growers to erroneously conclude that withholding water stimulates blooming. On the contrary, inadequate moisture not only curtails growth, but also delays flowering.

Precocious maturity with premature flowering may indicate disease. In chrysanthemums, this condition is caused by a vital infection known as Stunt Disease. The plants are stunted, and produce small, early, off-color blooms.

Kraus and Kraybil (1918) emphasized the significance of the carbohydrate to nitrogen relation in the tomato plant. With normal light, abundant water, and excess nitrogen, the plant responds with excessive vegetative growth but no bloom. If nitrogen is withheld, the carbohydrates accumulate, as they are not consumed in the synthesis of protein; therefore the plant response is both nonvegetative (short and woody) and nonfruitful (no bloom). The plant is in similar distress but with frail growth (short and slender) when the nitrogen is abundant but the light is inadequate for normal photosynthesis; here the carbohydrate production becomes too low for the adequate synthesis of protein essential for growth. Only in nutritional balance will the response be both vegetative and reproductive — in adequate light and with moderate amount of available nitrates.

All of the elements involved in plant growth are of vital importance. Physiological balance requires the adequate and simultaneous presence of all the building materials. Each nutritional

element can function only in conjunction with other nutritional ingredients. Each component resembles a link in a chain. The absence of any single link destroys the function of the others. In the winter, the factors for nutritional balance in northern greenhouses differ from those of summer even for the same type of plant. The northern winters have a maximum of 9 hours of sunshine versus 14 hours in the summer. Cloudy days and low intensity of light further reduce the available sunshine. The amount of mid-winter (Dec.-Jan.) light is less than 30 per cent of that in June.

Plants should not be forced beyond their photosynthetic capacity to produce food. Water and fertilizer should be reduced in relation to diminished sunshine. Lower temperatures should be carried to retard respiration. The plant's reserve (sugar) is at its lowest and rigid economy is essential. Even with maximum sunshine, unless the greenhouse ventilation is adequate, photosynthesis may be retarded due to limited carbon-dioxide. Excessive fertilizers, water, and high temperatures have a pernicious influence which affect crops in various ways. In snapdragons, such overforcing produces stubby, terminal spikes with 5 or 6 half-open flowers on soft hollow stems. Such flowers are very short-lived. Many of the flower-buds cannot develop due to the blasted condition of the anthers, stigma, and petals, caused by starvation. Overforcing of chrysanthemums produce small, soft, faded blooms on thin, hollow stems that frequently are too weak to support the flowers. Borderline deficiencies may not result in immediate death, but always produce a condition of suboptimal health. Such debilities result in low resistance, distorted and retarded growth, and sterility.

Specific factors in the control of flowering, such as day-length (photoperiod) and low temperature, deal with genetic adaptations. The effects of day-length on plant growth has been known for many years. Laurie and Poesch (1939) credit John Ray with the first record on this subject. This observer in Historia Plantarum (1686) described the differences induced by light variation. H. A. Allard (1914) states that A. Henfrey in his book "The Vegetation of Europe" (1852) comments that day-length was the factor which controlled the natural distribution of plants. Klebs in Germany (1913) concluded from his experiments that flowering in Sempervivum funkii was dependent on day-length. He could not induce flowering by nutritional or temperature changes, but the plants produced flowers after several days of continuous artificial illumination. The control non-lighted plants remained vegetative. However, the fundamental principles of photoperiodism dates back to 1920 when Garner and Allard of the U. S. Department of Agriculture published their famous investigation on the effects of daylength and its relation to vegetative and reproductive growth. These observers noted that a new variety of tobacco (Maryland Mammouth) in contrast with other varieties, remained in a vegetative condition throughout the open growing season at Washington. When the weather became cold some of these plants were transplanted in the greenhouse where they bloomed and developed seed in the winter months. During summer outside growth, these tobacco plants attained a height of 15 or more feet with many leaves; however, when grown in a greenhouse in the winter months, they invariably bloomed at less than 5 feet in height with relatively few leaves. It became obvious that the season of the year in which the Mammouth tobacco grows determines its giant character. They also observed that multiple plantings of soy beans at frequent succession in the spring and early summer flowered simultaneously. They concluded that the time of blooming in

light-sensitive plants was determined by the duration of the daily illumination rather than its amount. It is this significant distinction that credits Garner and Allard as the discoverers of photoperiodism. The botanical world was indeed amazed that such a seemingly insignificant factor as duration of light could exert such a profound influence on plant development. The previous investigators considered day-length only as a quantitative factor of light, and there seemed to be no physiological basis to consider it otherwise.

Plants that are sensitive to the length-of-day factor technically known as photoperiodism — are adapted to change from the vegetative to the reproductive stage at a specific day-length characteristic of the species. The range of daylength varies with the season — from 15 hours in the summer to 9 hours in the winter in temperate regions. Short-day plants will only flower in photoperiods shorter than their critical daylength, and vegetables when the light exposure is above it. In a precisely reverse response, long-day plants promote flower formation only when the daily light exceeds the critical day-length, and vegetate when the exposure is below this day-length value. Plants (e.g., chrysanthemum, dahlia, poinsittia) that bloom in the late summer, autumn, and winter are short-day plants; radish, lettuce, and annuals grown for spring flowering are long-day plants; the tomato, rose, and carnation belong to the day-neutral or indeterminate group which blooms at all seasons irrespective of day-length. The life cycle of day-neutral plants proceeds as fast as their food supply and growing conditions permit.

Strictly speaking, the critical factor in photo-periodically sensitive plants actually depends on night-length rather than day-length for floral induction or its inhibition. The terms long-night and short-night, rather than short-day and long-day are truly descriptive and logically should be the proper classification. Day-length, per se, does not control flowering, but it does indicate the relative night-length following a photo-period. Interrupting the light period does not interfere with blooming; a break in the dark period of long-night plants inhibits flowering.

Floral initiation depends on the formation of a specific hormone (florigen) produced in the leaves. Its biosynthesis requires two sets of interreacting changes; one requires light, and the other darkness. The effects produced in the light (photochemical reactions) and quickly completed; the chemical changes occurring in the dark are sensitive to light and are reversed by it, and therefore need a long time for completion. The reactions that occur in the dark cannot take place without the preceding photochemical changes.

(To be concluded in January issue.)

CALENDAR OF EVENTS FOR DECEMBER AT THE GARDEN

2nd	8 P.M.	Cactomaniacs Christmas Party
3rd	3 P.M.	Class — Desert Wild Flowers
4th	3 P.M.	Lecture — National Monuments in Arizona
10th	9:30 A.M.	Class — all day Field Trip
11th	3 P.M.	Lecture — Arizona Indian
18th	3 P.M.	Lecture — Trip thru Mexico
11th	3 P.M.	Lecture — Arizona Indians
25th	3 P.M.	Lecture — Arizona Wildflowers